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Arlington Street.

THERE are historic sites in our metropolis the disappearance of which is well calculated to rouse the regrets of those interested in the memories of the past; there are other sites, however, the demolition of which, though their interest is, in a measure, scarcely less, need in no way excite the susceptibilities of the antiquary. Among these latter may be classed the clearing which is now being effected at a characteristic corner of Piccadilly, that abutting on to the north-east corner of the Green Park, carrying with it two important houses in Arlington-street. The historical associations connected with Arlington-street are many and interesting. Horace Walpole, long one of its residents, termed it, more than a century ago, "the Ministerial Street," but since his time political associations have gathered even more thickly in the quiet little thoroughfare in which is situated the well-known London home of our present Prime Minister. It would seem as if the influence of the first Earl of Arlington had exercised its charm over the street which bears the name of Charles II.'s Minister, familiar to readers of Pepys' and Evelyn's diaries as "Mr. Secretary Bennet," and associated for all time with the ill-famed "Cabal Ministry."

When about 1690 or so Arlington-street was built on property belonging to the Earl of Arlington it seems immediately to have been occupied by fashionable residents, among whom stands foremost the Duchess of Buckingham, the widow of Charles's ill-chosen companion. With the last years of the seventeenth-century the Ministerial associations of the street commence, among the residents being the Earl of Kingston, Lord Guildford, Lord Cholmondeley, the Earl of Peterborough, and Lord Brooke, joined a little later by the Duke of Richmond. The Earl of Kingston was long a resident, the house remaining in the family till 1770, when it was sold. An interest attaches to the place from its association with the early successes of pretty Lady Mary Pierrepoint, before the days when the later eccentricities of Lady Mary Montague amused London society and inspired the witty pen of Horace Walpole. With Arlington-street the Walpoles are indelibly associated, and, thanks to the care of the Society of Arts, a tablet marks the site of the house so long occupied by the stout old Norfolk squire, who, in the venal days of the early Georges, governed England, as he said, by bad Latin. Sir Robert lived in Arlington-street from 1715 till his death, and after him the house descended to his son, Horace Walpole, who from this address dated not a few of those delightful letters which give such an insight into the fashionable life of the last century. More intimately associated as Walpole may be with Strawberry Hill, to him Arlington-street had been familiar from his childhood; for there he had been born in his father's first house, opposite that now marked by the Society of Arts' tablet. Horace resided in Arlington-street till in 1779 he moved to Berkeley-square, where, as the scarcely recognisable "Lord Orford" of the Court Guides, he breathed his last.

The whole political interest of the earlier Georges' reign may be said to have centred in Arlington-street. Next door to Sir Robert Walpole lived his implacable rival, William Pulteney, later created Earl Bath, and here he remained till he moved to the well-known house in Piccadilly, now occupied by Lord Ashburton. Henry Pelham, the brother of the Duke of Newcastle, who played such an active part in the events of the Second George's reign, is another resident whose memory adds to the Ministerial associations of Arlington-street. The house (No. 17), one which has long been in possession of the family of its present occupant, the Earl of Yarborough, was originally designed by Kent, and, after passing through the hands of Henry Pelham, became the residence of the Duke of Grafton. It is worthy of remark that Henry Pelham's wife was the eldest daughter of the second Duke of Rutland, and his Grace we find a resident of the street in later years, and here again we come upon Ministerial associations, for it was through the Duke of Rutland that Pitt was first returned to Parliament. It was at this house that in 1827, it may be mentioned, died suddenly in his chair the Duke of York.

Further Ministerial associations in connexion with Arlington-street centre round the residence of that clever stateman Lord Carteret, later created Earl of Granville, whose active influence in the political history of the last century can be traced to this day, not only in the share he took in the institution of our existing septennial Parliaments, but who may be regarded as the founder of that traditionary policy of watchfulness of Russia's aggressiveness, which, from the time of Lord Carteret's first check to Peter the Great till the present moment, may be said to form one of the chief cares of our successive Foreign Ministers. Discourteous as he may have been, in spite of his elegance as a scholar; unpopular as he was with his colleagues, the Earl of Granville has left his mark on English history, and his residence in Arlington-street adds one more to the many Ministerial associations of the thoroughfare.

With other actors in the political disturbances of the Georgian era, Arlington-street is closely associated. To Arlington-street, Frederick, Prince of Wales, retired to sulk; and from the roof of Lord Middlesex's house we have contemporary evidence that he and his Princess witnessed, in 1749, the fireworks in the Green Park on the occasion of the Peace of Aix-la-Chapelle.

Turning over the pages of the old Court Guides we find many other residents of Arlington-street intimately associated with our political past. The "Lord Yarborough" who, in 1797, the year of the first issue of Boyle's "Fashionable Court Guide," is mentioned as residing at No. 17 (still in possession of the family) was the father of the first earl, and from his close relationship with the Pelham family, associates Arlington-street still further with Ministerial memories, for his mother was sister to Charles Pelham and Thomas Pelham, the Minister who at the beginning of this century, it will be remembered, was, for his political services, created Earl of Chichester. The "Earl of Pembroke," residing at No. 9 in 1797, is George, the eleventh Earl, whose benefactions at historic Wilton have to this day left their memory. The "Lord Gage," residing in this same year, 1797, at No. 16, is the third Viscount, and son of the General Gage whose disastrous defeat at Bunker's Hill marks an epoch in the story of our separation from our American colonies. A few years later, in 1810, the *Court Guide* points out another Minister as residing in Arlington-street, "Lord Melville," who, it may be remembered, was impeached for malversation of funds while in office, but, like his whilom neighbour Carteret in a similar case, acquitted by his peers. The same year we find living at No. 24,—the house now being demolished,—"Earl Camden," not, it must be recalled, the great Lord Chancellor Pratt himself, but his son. It is worthy of remark that the house thus associated with the memory of one who holds a foremost place among the champions of the liberty of the press, should, till within a few weeks, have been the residence of a gentleman whose name in connexion with newspaper literature is of world-wide renown. Earl Gower, who, in 1799, was a resident at No. 21, was the second Earl, and grandfather of the well-known Duke of Sutherland of later days. Being the grandson of Lady Evelyn Pierrepoint, his relationship to the family of the Kingstons points probably to this as the house long owned by the father of Lady Mary Wortley Montague.

Among other residents associated with our political history, Charles James Fox should

not be overlooked, short as was the time he lived in the street; as likewise Lord Nelson. A special interest, however, centres round the historic "No. 20," the town residence of the Marquises of Salisbury, and now occupied by our present Premier. To his once neighbour, Sir Robert Walpole, he and his predecessors since Walpole's time owe the pleasant house in Downing-street they occupy while in office; for when the house was offered as a gift to George I.'s old Minister on his resignation, he generously refused the attention, and begged it might be made the permanent residence of the successive "First Lords of the Treasury," and from that day to this the historic date, "No. 10, Downing-street," has headed the decrees issued by our Premiers.

For over a century Arlington-street has been associated with the owners of Hatfield. In 1786 the king and Queen Charlotte were sponsors to the little daughters of the first Marquis, and honoured by their presence the christening in Arlington-street. Lady Georgiana, in after years the wife of the well-known ambassador, Lord Cowley, adds one more Ministerial association to the street. With a few still among us the memory has not passed away of the Sunday receptions at "No. 20" given by "Old Sarum," as the Marchioness was somewhat disrespectfully termed in a certain circle of "society" half a century back. With fashion and its doings Arlington-street has for two centuries been associated. If, indeed, the array of stately sedan chairs, which visitors will remember in the spacious hall of the former Duke of Beaufort's well-known house in Arlington-street, could but tell a tale of their trottings about St. James's and Mayfair, with their aid not a few other memories,—some, too, with a pleasant dash of scandal in them,—might have been added to the many associations which cluster round Ministerial Arlington-street.

Architecturally speaking, there is a certain interest in the aspect of Arlington-street; its west side, at all events, presenting one of those characteristic bits of unstudied effect and variety which are found here and there unexpectedly in streets of that era in London. The east side is plainness itself, and the house decorated with the plate in memory of Sir Robert Walpole may suggest that Horace's vagaries at Strawberry Hill were a kind of reaction from the effect of the sober and prim aspect of the brick front which he inherited from his father. But the opposite side of the street has an air of old-fashioned and rather faded stateliness, which is pleasant enough. The setting back of two of the houses, with fairly large open court-yards before them, gives a spacious effect and an air of dignified reserve, putting the place quite apart from an ordinary street, even such as are found in the sacred neighbourhood of Mayfair. Then Lord Salisbury's house, with its palatial arrangement of the advance guard or entrance block, connected by a lower isthmus of building with the mainland of the mansion, and with a certain accidental or intentional reminiscence of Hatfield about it, forms a dignified group in itself, and a piquant contrast to the sober classicism of Lord Wimborne's house, No. 22, with its low proportions and the elegant colonnade of its *porte-cochère*. The intervening house, No. 21, assists the effect chiefly by contributing to the open space and general look of dignity of the group, and separating its neighbours on either hand, which might otherwise form too harsh an architectural contrast. The upper portion of the street, as all Londoners know, is a favourite imaginary (purely imaginary) "short cut" with cabmen between St. James's-street and Piccadilly, and probably few of those who are strangers to the place drive through this bit of street without giving a look at this group of residences as they pass, and admiring the little bit of effect upon which the passenger suddenly comes on turning the corner from Bennett-street or Piccadilly.

There is no probability, we imagine, of this part of the street being disturbed for many a day, but we understand that the Bath Hotel at the corner is to put off its sober livery of painted cement, and blossom into a new and more extensive and ornate brick house, from the design of Mr. Tarver. The large clearance already made along Piccadilly, where by night the day's work is being carried on under a flare of light which produces a fine effect on turning the corner out of Bond-street, is to be the site of a very large block of residential chambers, designed by Mr. Milne, in a style very similar to the smaller block of residential chambers built not long since on the north side of Piccadilly, a little further west, and overlooking the Green Park. The elevation, not yet visible out of the ground, presents a building which will be an effective addition to Piccadilly architecture, though suggesting very different associations, architectural and social, from the group of houses which give to Arlington-street its special dignity and character.

THE LATE MR. GEORGE VULLIAMY.

WE record with sincere regret the death, on the 12th inst., of Mr. George Vulliamy, the Superintending Architect to the Metropolitan Board of Works, at his residence, Ingress House, Greenhithe, adjoining Ingress Abbey.

Mr. Vulliamy, who was in his seventieth year, having been born on the 19th of May 1817, was the second son of Mr. Benjamin Lewis Vulliamy, the eminent watch and clock maker, of Pall Mall. The family was of Swiss origin. In the year 1704 one Justin Vulliamy emigrated to England, and associated himself with John Gray, an English clockmaker of some celebrity, and established a business in Pall Mall, in the house in which it was continued until Mr. Benjamin Vulliamy's death in 1854. They obtained the appointment of clockmakers to the Crown, which was continued to their successors, with an annual grant of 500*l.* a year. On the accession of her present Majesty the grant was suppressed, but the title was permitted to be retained.

Mr. Vulliamy's father was a man of considerable ability, and amassed a comfortable fortune. He was the first clockmaker to employ the two-seconds pendulum, and he effected some important improvements in the construction of large public clocks. He sank also the first artesian well in this country at his estate at Norlands, at the foot of Notting-hill, which is now covered by Norland-square and the adjacent streets. This work was finished in November, 1794. The well still exists, although now only about 60 ft. deep, at the back of No. 4, Norland-terrace, Uxbridge-road, where the old engine-room is still to be seen. In the year 1849 Mr. Vulliamy was presented by the Court of the Clockmakers' Company (of which he was five times Master) with a service of plate, with a complimentary inscription, which is given at length in Mr. Overall's "Account of the Clockmakers' Company," page 176. Mr. Vulliamy's died January 8th, 1854, aged 74, and bequeathed by will to the Clockmakers' Company three portraits of members of his family, and one picture, which are preserved in the Guildhall,—the hall of the company not having been rebuilt after the Great Fire.

Mr. George John Vulliamy was born in Pall Mall in the house where his father had long carried on business. The house has been demolished, and the site, which was situate between Sir Mark Wood's house and Hammersley's Bank, is now partly occupied by the Marlborough Club, adjoining Marlborough House. There is an illustration of the house from an old print in Cassell's "Old and New London," vol. iv., page 139.

Mr. Vulliamy was educated at Westminster School, but appears to have left school early, and was articled first to Messrs. Joseph Bramah & Sons, the engineers, with whom he remained for three years. In July, 1836, being then in his nineteenth year, he was articled to the late Sir Charles Barry, who was at that time engaged upon the working drawings for the first contract for the Houses of Parliament. Mr. Vulliamy's first occupation with Sir Charles Barry was to square dimensions for the bills of quantities for the contract, which were taken out in Barry's office by Mr. (afterwards Sir Henry Arthur) Hunt.

Mr. Vulliamy was articled to Barry for five years, and during the term of his apprenticeship, from 1836 to 1841, Sir Charles designed the Reform Club, Highclere House, Trentham Hall, Harewood House, and numerous other buildings, upon the drawings for which Mr. Vulliamy assisted. He also worked upon the drawings for the completion of the Palace of Westminster, and was Barry's favourite pupil, the most cordial relations subsisting between them up to Barry's death. In 1837 Sir Charles Barry gained the first premium for the Reform Club in a limited competition with Basevi, Blore, Smirke, Decimus Burton, and Cockerell. In 1840 he made some fine designs for converting Highclere, a seat of Lord Carnarvon's, into an irregular Italian villa; about the same time he completed the additions to University College, Oxford. In 1841 he designed Bridgewater House. Mr. Vulliamy superintended the works at the Reform Club and Highclere as the architect's clerk of the works.

On the completion of his articles with Barry, Mr. Vulliamy travelled abroad, and made an extensive tour in France, Italy, Greece, Asia Minor, and Upper and Lower Egypt, during the years 1841-3, his travels in Egypt extending as far as the second cataract of the Nile. He made numerous drawings, being at that time a most enthusiastic worker, and kept a journal. His travelling companions were Mr. W. Monckton Milnes (afterwards Lord Houghton, with whom he ascended the Nile), Mr. F. C. Penrose, Mr. Thos. Hayes, Mr. William Wild (now curator of Sir John Soane's Museum), Mr. (now Sir Horace) Jones, Mr. T. Hayter Lewis, Mr. Arthur Green (Sir Wm. Tite's nephew), Mr. C. Cattermole (the painter), Mr. Charles Vacher, Mr. Redford (a promising young artist, a *protégé* of Lord Kilmorey, who died young), Mr. B. O'Neil (afterwards R.A.), and others more or less distinguished in different walks of life.

During his residence abroad Mr. Vulliamy was employed by Mr. H. Gally Knight, to make drawings for his work on the Ecclesiastical Architecture of Italy. The plates representing the Duomo at Orvieto, and the general view of Orvieto, the latter reproduced in lithography by Mr. Edward Lear (vol. ii., plates 25 and 26) are from Mr. Vulliamy's drawings. He also during this time designed a Gothic villa for a Russian nobleman, to be built on the shores of the Baltic, which was subsequently carried out.

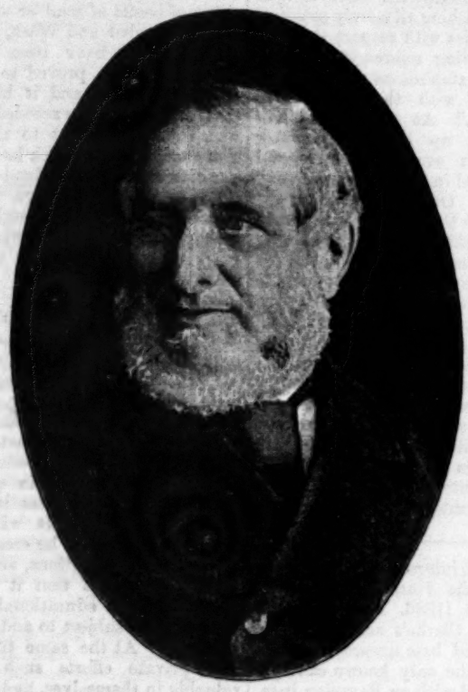
On his return to England in 1843 Mr. Vulliamy commenced business as an architect on the second floor of No. 26, Suffolk-street, at the corner of Pall Mall East, and soon acquired a considerable practice. He afterwards joined his uncle, Mr. Lewis Vulliamy, who had a very extensive connexion among the nobility and wealthy people, and assisted him for some years in his architectural work,—the whole of the drawings for Dorchester House, Mr. Holford's mansion in Park-lane, and other large buildings having been by his hand. In 1851 Mr. Vulliamy married.

In 1861 Mr. Marrable resigned his appointment of Superintending Architect to the Metropolitan Board of Works in consequence of the Board having declined to increase his salary, and Mr. Vulliamy, being dissatisfied with his uncle's treatment of him, became a candidate for the vacant appointment, and in March, 1861, he was elected Superintending Architect to the Board, mainly through the influence of Mr. (afterwards Sir William) Tite, who was at that time a prominent member of the Board.

This post Mr. Vulliamy occupied until his death, on Friday last, with universal acceptance. Very few people have passed through life with fewer enemies than Mr. Vulliamy: conciliatory and courteous to all, he discharged the duties of an extremely difficult and onerous position with general approval, and whatever scandals may have been whispered abroad about the Board and its other officers, there has never been a shade of suspicion attaching to the fair fame of the Superintending Architect.

Mr. Vulliamy's artistic career may be said

to have terminated in 1861 on his appointment as Architect to the Metropolitan Board, the work of the Board being mostly of a strictly utilitarian character. For the Metropolitan Board he designed the group of buildings on the south side of Queen Victoria-street, between Bucklersbury and Size-lane, extensive additions in the rear of, and an additional story to, the offices of the Board in Spring-gardens; a block of stables in Park-lane, and several of the Fire



THE LATE MR. GEORGE VULLIAMY,
Superintending Architect to the Metropolitan Board of Works.

Brigade stations. He also designed the lamp standards on the Victoria Embankment, which are very gracefully composed, and the large lamp at the entrance to Northumberland Avenue.

Among his other works may be mentioned the French Protestant Church, Bloomsbury-street, which has been recently laid bare by the demolition of houses for the construction of the new street from Piccadilly-circus to Tottenham Court-road; a church and schools at Queenhithe; a memorial tower to the Earl of Ellesmere; a mansion at Dyffryn, in Merionethshire, for Mr. H. P. Powell, M.P., erected at a cost of 70,000*l.*; the restoration of the north transept of Rochester Cathedral; All Saints' Church, Ennismore-gardens, Knightsbridge; Fire Brigade buildings in different parts of the metropolis (in which he was largely assisted by Mr. Alfred Mott); Lodges, Tooting Bec-common, Bostal Heath, and Blackheath; the pedestal and sphinxes for the Cleopatra's Needle on the Victoria Embankment, &c.

A short time previously to his death he was engaged in making designs for laying out the ground at the corner of Piccadilly, for which he made several studies. He also made several drawings for proposed continuous elevations for the frontages in Northumberland-avenue, but these were not carried out. It may be added that Mr. Vulliamy was for many years the Secretary of the Royal Archæological Institute of Great Britain and Ireland.

NOTES.

THE *American Architect* for October 30, which came to hand just after the publication of our last issue, devotes its first editorial paragraph to an appreciative notice of the life and labours of Mr. George Godwin, F.R.S., F.S.A., who was the conductor of this journal for nearly forty years, resigning that position three years ago. What is said of Mr. Godwin by our contemporary is all perfectly true, with the exception of the initial statement, which is an announcement of Mr. Godwin's death. Happily, as many of our readers know, and as all will be glad to hear, Mr. George Godwin is still in the land of the living, and only a few days ago he attended and spoke at the meeting held in the Library Committee Room, Guildhall, to promote the registration of all competent plumbers. The mistake is apparently due to a careless telegraphist. Curiously enough the same number of our contemporary makes reference to the death of the late Mr. E. W. Godwin, who, it says, "must not be confounded with Mr. George Godwin, lately the Editor of the *Builder*," which, however, appears to be exactly what the *American Architect* has been betrayed into doing.

THE arrangements for the establishment of the Imperial Institute progress very slowly, and even the necessary preliminary of what form it should take, and when it should be built, is not in the faintest degree settled. It is to be hoped, however, that the Committee which the Prince of Wales has judiciously selected outside the South Kensington influence, will be able to arrive at some solution of the question, which may be satisfactory to the public and the distant world of Colonists for whom the Institute is chiefly designed. At present there are conflicting rumours, the latest being that the scheme of re-opening the "Colinderies" next year as a basis appears to be finding favour, and there can be no doubt but that the highest influence is being brought to bear to secure that object. One thing seems quite certain, viz., that there can be no pretence of having a building of any kind to show in time for the jubilee celebration; for before there can be any attempt at construction, there are the plans to be made, the money to be obtained, the scheme to be elaborated in all its many details, and a thousand other things which cannot be slurred over. The experience of the Exhibition accounts of the last three or four years, which are eminently unsatisfactory, will, it is to be hoped, be a standing warning that the new Institute should be conducted on strictly business principles. In the meantime, the London Chamber of Commerce has determined that a Commercial Museum will be of advantage to the mercantile community. We thoroughly agree with this conclusion, although to a certain extent it will clash with the Colonial undertaking. But we cannot have too much of a good thing, and as an additional link in the grand Federation movement we welcome it most heartily.

THE subject discussed at the meeting of the Statistical Society on Tuesday was the cost and conditions of working railway traffic in different countries. It was introduced by Mr. J. S. Jeans, who was followed by several eminent authorities upon the subject. Mr. Jeans complained that our railway companies do not furnish sufficient data for such calculations as the cost per ton-mile, &c., which, however, is certainly very much in excess of that of other countries. Mr. Mundella also thought that the public should have more information on the subject, and considered that, in view of future legislation, it would be wise for the companies to anticipate much that must be done in this direction. He also dwelt upon the foolish competition and lack of good arrangements among the companies. This explains, to a considerable extent, their inability to meet the wishes of their customers for cheaper rates, although, of course, the tremendous cost of promoting the lines in the first place,—setting aside cost of construction,—is a permanent clog upon their profits. This latter circumstance handicaps the British lines in comparison with those of other countries, and being, unfortunately, irremediable, it behoves the companies to avoid unnecessary competition, and make the most of every opportunity of acting in concert for the public benefit. One of the Railway Commissioners,—Mr. W. P. Price,—took part in the discussion, and drew attention to the great advantages we possess in respect of speed and comfort as compared with Continental railway travelling, showing that economy in working is not always an unmixed blessing.

THE recent decision of the Court of Appeal arising out of the over-issue of debentures in the Charnwood Forest Railway is of considerable commercial importance. The debentures in question were signed by two of the directors, and sealed in the presence of all. The company was wound up, and the ordinary creditors received nothing, but the lawful debenture-holders were paid in full. The plaintiff, who held the debentures in question, and was the contractor of the line, received, of course, nothing from the company, and an action was begun against the directors personally. It was held that the contractor,—or rather his executors, for he had died since the transaction,—was entitled to recover the full value of the debentures. It is clear that this was a case in which one of two innocent parties would have to suffer, and the old legal rule applies that the one to suffer must be the one through whose action the loss is incurred; that is to say, the directors, by issuing the debentures, caused the loss; for although the fraud was committed by the secretary, yet they were, so to say, the instruments to affect a third party. The legal rule was also given in the judgment of the Court. The practical point arising out of the case is that it shows how careful directors should be in looking into the affairs of joint-stock companies with which they are connected. The loss to the directors of this railway will doubtless be a useful warning to others.

SOME investigations have been made by Dr. C. Schumann with a view to determining the value of blast-furnace slag, or slag cement, in the composition of mortar. A vitreous slag, however finely powdered, will not set

under water, but if it be chilled in water as it flows it will, mixed with lime, form a hydraulic mortar. Slag granulated and ground up with lime and other ingredients is sold under the name of "Pozzuolana cement," and it was with this material that the tests in question were made. To test for porosity the slag cement was mixed with three times its weight of sand, and the cakes, 1·5 centimètre thick, were allowed to set for seven days, being placed either in water or in an atmosphere charged with moisture. A water pressure of 5 mètres was then put on them for a week. With the water-hardened pieces the amount of water passed when subject to this test was 1·60 cubic centimètre, whilst cakes of Portland cement, prepared in an exactly similar manner, did not let any water pass through when subjected to a similar test. The cakes hardened in damp air permitted 6·05 cubic centimètres to percolate through, whilst Portland cement cakes similarly prepared passed 1·8 cubic centimètre. Slag cement will set very slowly, the increase in strength being slower than in Portland cement. A mixture of three of sand and one of slag cement had a strength of 6·6 kilograms per square centimètre against 17·1 kilograms for Portland cement mortar of the same proportions, whilst the crushing strength was 107·2 kilograms per square centimètre against 200·8 for similar Portland cement mortar. In this case the mixtures had remained under water for twenty-eight days, but the tests made after air exposure were still more striking, the slag cement mortar having a strength of 12·8 kilograms per square centimètre against 36·3 kilograms for Portland cement mortar. It should be noted also that the greater the quantity of water used the more marked was the superiority of Portland cement.

THE recent case of Parker *v.* Inge is a blow to landlords who object to sanitary improvements. A nuisance was found in existence in some premises in Birmingham arising from defective construction of the premises. The Local Authority thereupon served a notice on the owner to remedy the defect. He refused to do so on the ground that there was a tenant in possession, and that he could not properly enter on the premises except for certain reasons specified. But the Court decided that the owner was liable to do the work. He was the owner within the meaning of Section 94 of the Public Health Act. If he showed by evidence that he had asked to go on the premises, and could not do so by some act of the tenant, he could, under Section 98, show that he had "used all due diligence to carry out" the order, and would not be liable for any penalties. As Mr. Justice Cave said, it would be hard on an occupier that he should have to make good structural defects which arose from the act of the owner. Again, Baron Pollock observed, "It is not probable that the tenant in the great majority of instances would object to his landlord coming on the premises to abate a nuisance which was injurious to the health of the persons living there." We should think not. On the contrary, in most cases a landlord who would set up the objection that he was not bound to do structural work to remedy a nuisance because he was not the actual occupier of the premises, would equally refuse to do anything at the request of the tenant.

ACCORDING to some particulars contributed to the *Annales des Ponts et Chaussées* by M. Considère, it has been found that the wheels of a locomotive crossing the Puy l'Évêque bridge at the rate of 31 miles an hour, produced a pressure of about 13 tons on the top flange of one of the girders, which developed dynamical strains in the adjacent lattice bars of 1·59 tons per square inch in the normal section, and 2·1 tons in the weaker parts. If, however, the shock had been produced in the centre of the interval between the connexion of the lattice bars, instead of close to a point of connexion, a tensional strain of 3·24 tons would have been produced in the lower fibres of the flange.

THE first number of the "Dizionario Epigrafico di Antichita Romane," issued by the R. Accademia dei Lincei, has just appeared. Such a book has long been wanted, and we think an English translation would not be out of place. The mass of material constantly accumulating from Italian excavations makes it extremely difficult for any one except the specialist (and, indeed, even for him) to lay his hand on the precise material he wants. The object of the present dictionary is, as announced in the introduction, to "help the student of history, of archæology, and even of law, to utilise the inscriptions discovered in excavations, by diminishing all merely practical and technical difficulties with respect to them, and chiefly by facilitating reference, and thus to bring into closer juxtaposition the evidence of Latin epigraphy with that of Roman antiquities in general." At present, full half the material turned up by the excavator never filters through even to the special student; it is absorbed in the "transactions" of learned societies. Our only fear for the present undertaking is that it may attempt to cover too wide a field, and so languish, as antiquarian dictionaries so often do, in the A's and B's. The Academy has decided to include (1) religion and mythology, taking in the priests, sacred rites, &c.; (2) politics, with the organisation of provinces and municipal towns; (3) fiscal, judicial, military regulations with all terms relating to mines, public works, the mint, &c.; (4) jurisprudence; (5) corporations and social institutions generally; (6) professions, arts, trades; (7) public games, festivals, &c. The first issue carries us from "Abacus" to "Achaia." The editor's name,—Professor Ruggiero,—is a guarantee for the quality of the work.

PERHAPS the most interesting paper in the new number of the *American Journal of Archæology*, just out (1886, II., No. 3), is Mr. Joseph Thacker Clarke's account of the archaic Doric shaft and base unearthed in the Necropolis of Assos, the only known example of that order provided with an Egyptian base. For the architectural interest of this column we refer to Mr. Clarke's paper, which is illustrated fully, in which he embraces a theory of his own as to the origin of the stylobate, but we may note that the column has also especial interest, owing to the inscription running down two of the flutings. Unhappily, this is broken away, but enough remains to show that the column was in all probability no member of an architectural whole, but a monument itself, very probably surmounting a cenotaph. The column stands in the living rock, so that it is impossible that any bodies could have been buried beneath. Further, in all probability it was surmounted by some symbolic figure, like the Siren which stood on the tomb of the ruler Isocrates, near the Kynosarges. Such columns,—freestanding shafts, surmounted by figures,—frequently appear on vases, coins, &c. The loss of the remainder of the column is, indeed, matter for the deepest regret. The art of Assos was so provincial, that archaic peculiarities lingered on long after they became extinct in more forward states; and we might have had some early type of Siren hitherto unknown. It is, however, matter for thankfulness that any of the column is left as a good piece of the base had been hewn away to admit the corner of a Roman sarcophagus.

AN interesting paper has just been read by Mr. Topley, before the Geologists' Association, on the erosion of the sea coast, a subject which is of considerable importance to the country at large, and to coast landowners in particular. Most people are aware that in certain maritime counties there is more or less loss of land from the action of the sea, though comparatively few know how rapid that action sometimes is. In the commencement of 1877 not less than three yards were cut off from Norfolk for a distance of many miles, while at one spot called Bacton the loss was 15 yards. At certain localities and watering places, such as Cromer and Folkestone, the destruction of building ground is very serious, the erosion at Copt Point, east of Folkestone Harbour, being so great, owing to the accumulation of shingle by the pier to the west, that the board declaring the excellence of the site for building purposes is well on its downward way to the sea. At the Blackrock end of Brighton, too, the danger notices are fast being extended, and it will not be long ere the Rottingdean-road is a thing of the past. It would be naturally supposed that the destruction of all England was merely a work of time; but on this point Mr. Topley is reassuring, showing that most of the eroded land was to be met with elsewhere in the shape of banks of sand or silt in some estuary. In the Humber and Wash, for instance, large accumulations have been met with, which, when reclaimed, proved to be most valuable agricultural land, and it has been calculated that these masses exceeded the area of that which had been lost to the Norfolk Coast. The conclusion to which he came on the whole question was, that England is pretty much as big as it was 500 years ago. This is encouraging to us as a nation, although not so much so, perhaps, to those landowners who see their property carried off to make property for other persons.

THE new workshop at the Jewish Orphan Asylum at West Norwood, which has been built and supplied with appliances by Mr. B. L. Cohen, was opened on Sunday last. When the necessity of technical education is so great, this workshop will be of the highest value. For, apart from the advantages of the technical education to the inmates of the Asylum in question, there can be very little doubt that it will have another kind of influence. It will probably cause similar workshops to be erected in other places and at other institutions, and its success,—for we cannot doubt that it will be one,—will probably cause educational bodies now hesitating on the subject to add workshops to their buildings. At the same time, it is impossible that private efforts such as this, however valuable in themselves, and to particular institutions, can do away with the need for a complete system of technical education in connexion with public elementary schools.

THE Louvre possesses one of the only two Greek strigils or scrapers, with engraved handles, which, so far, have been discovered. This interesting piece of bronze has been published by M. Reinach in the *Bulletin de Correspondance Hellénique*, 1886. III. It is well known we have a number of strigils with sculptured handles, but,—probably by a mere chance,—only two that are engraved. One appears in M. Collignon's popular *Manuel d'Archéologie*, a book of which we have had occasion to speak both in the original form and in the translation which appeared in Mr. Sparkes's Fine Art Library. This specimen was in the Varvakeion Museum; exactly in what Athenian Museum it now stands in the general re-arrangement of antiquities at Athens, we are unable to say. The Louvre specimen is engraved with exquisite delicacy, much in the style of the finest Greek mirror-work. The design represents a youthful Hermes wearing the petasos and standing on an Ionic column. Hermes was the patron of the palæstra, and he stands on the column on the visible embodiment of the actual building. In the Berlin Museum there is a strigil with the caduceus of Hermes stamped on as the maker's mark.

THE sixty-four water-colour drawings by M. Gustave Morean, in illustration of La Fontaine's fables, which are now on view at Messrs. Boussod & Valadon's rooms in New Bond-street, represent an eccentric form of art, and are open to a good deal of criticism in regard to figure-drawing; but there is the interest of a distinct style and individuality about them, and many of them are both poetical in conception and rich and powerful (sometimes exaggerated) in colour. They are, moreover, examples of a true water-colour method, with no attempt at effects which are foreign to the true scope of this branch of art. Six of the drawings have been etched by M.

Bracquemond; the etching gives a finish to the design which is hardly discernible in the originals; but the element of colour is so important in the original drawings that they can hardly be said to be fairly represented in black and white.

PHILADELPHIA will soon have the highest tower "in creation." The town-hall of that city, which is rapidly nearing completion, will have a tower 537 ft. high, consequently 27 ft. higher than that of Cologne Cathedral. Until the erection of Eiffel's Tower at Paris, Philadelphia will possess the highest building. The tower is to be surmounted by a bronze statue (36 ft. high) of William Penn. The new town-hall, the foundatiou-stone of which was laid in 1872, will cost the city the enormous sum of twenty million dollars, and with very little to show for it architecturally except in mere bulk, for it is a poor and vulgar design.

TESTS FOR CEMENT.

THE American Society of Civil Engineers recently appointed a committee to consider "A Uniform System for Tests of Cement." In their report this committee recommends a tensile test in preference to a crushing test; for although the latter is of great value the appliances required are cumbersome and expensive. In large contracts it would be advisable to make crushing tests also, when the ends of the broken briquettes, reduced to 1 in. cubes, might be used.

The time recommended for the hardening of the briquettes is seven days, although when a known brand is being used one day may be allowable, but only for testing as to average quality. The sectional breaking area of the tensile briquettes should be 1 square inch. The cement should be passed through a No. 100 sieve (10,000 meshes to the square inch), made of No. 40 wire, Stubbs's gauge. Duplicate tests should also be made with the material as received, so as to learn whether possible deficiencies in grinding may be compensated for by other advantages in the material.

To test for defects from cracking, two cakes of neat cement, 2 in. or 3 in. in diameter and ½ in. thick, are made, the edges being thin. These cakes are subjected to General Gillmore's test, a 1-12th in. diameter wire being loaded with ¼ lb., and a 1-24th in. diameter wire being loaded with 1 lb., the time the cakes take to become hard enough to stand the test being noted. One cake is immersed in water and daily examined for cracks at the edges, whilst the other cake is exposed to the air, when its colour gives a guide as to the quality of the material.

In making tensile tests with "natural cements," one of cement by weight is mixed with one of sand; but with Portland cement only one of cement is used with three of sand. By natural cements are meant the lightly-burned American varieties. Portland cement includes the heavily-burned kinds, either natural or artificial. The sand and cement are mixed dry, and all water added at once, when the mixing must be rapid, yet complete. The mortar is firmly pressed into the moulds, without ramming, the moulds being laid on glass. When set, the briquettes are removed, covered with a damp cloth, and after twenty-four hours are immersed in water. The proportion of water for mixing neat Portland cement is 25 per cent., and for natural cement 20 per cent. With one of cement to one of sand 15 per cent. of water, and with three of sand to one of cement 12 per cent. of water may be used. The water for mixing and immersion should be 60 to 70 Fahr., and the testing-room of the same temperature. The test should be made immediately after removing from the water. The stress is applied at a uniform rate of 400 lb. per minute, but with weak mixtures one-half this rate may be used. Crushed quartz forms the best sand, and the best degree of fineness for cement is that between a No. 20 and No. 30 sieve. The setting of cement does not afford an indication of its final strength. Particulars of sieves used in cement tests are given in the Proceedings of the Institution of Civil Engineers, vol. lxxxv., sec. 3., and the full report may be found in the "Transactions of the American Society of Civil Engineers," vol. xiv., p. 475.

SPA FIELDS (OR NORTHAMPTON) CHAPEL.

THIS building, which will shortly be demolished in the course of alterations to the site, has had a curious history, and had at one time considerable importance in connection with the great religious revival of last century, a notable feature of which was the establishment of what is commonly known as the "Countess of Huntingdon's Connexion." Selina, second daughter and co-heiress of Washington (Shirley), second Earl Ferrers, married, in 1728, Theophilus (Hastings), ninth Earl of Huntingdon. Her ladyship was sister to the Lady Elizabeth Nightingale, whose effigy forms part of the well-known monument in West Minster. She was left a widow in 1746, with but three surviving children, and an ample fortune. But she thenceforward devoted her interests and her means to developing and maintaining Whitefield's Calvinistic teaching as opposed to the Arminianism of Wesley. She largely contributed to the building of chapels, the support of ministers, and the foundation of a training college at Trevecca in Wales. Her abilities can be estimated by a successful direction of so large an association, including the difficult task of controlling a body of uneducated, however zealous, lay preachers. Moreover, opposite as were her religious tenets and practices to those of her own social world, she preserved to the last her intimacy with many eminent and noted men of her day: several bishops, together with Bolingbroke and Chesterfield, could boast of enjoying her hospitality and friendship. This eminent woman died at a good old age, in her house adjoining the above-named chapel, in 1791,—the year also of Wesley's death,—having been reluctantly compelled at length to submit to a formal separation from the Established Church, so as to secure for her congregations and their ministers that legal protection which the Act of Toleration could afford. She was buried in the family vault at Ashby-de-la-Zouche. The college has since been removed to Cheshunt.

For a while Lady Huntingdon lived in Spa-fields, Clerkenwell. Her house, at present Nos. 24 and 26, Exmouth-street, stood in what was once Braynes-row, and is shown in Thornton's engraving after Hamilton, of 1783. This row formed the southern side of the modern Exmouth-street; its modern style, dating from about seventy years ago, being a tribute to the popularity of Admiral Sir Edward Pellew, Bart.* Braynes-row, by the way, must not be confounded with Baynes-row, or street, further westwards.† Next west to the countess's house was a circular building, which, together with the house in question, had been opened in 1775 as a place of entertainment or resort, by name of the Spa-fields Pantheon. The pantheon was purchased by her ladyship in 1779; and, as re-adapted for worship, soon became a leading chapel attached to the "Connexion." It is lighted by three rows of windows, and a round lantern over the cupola. The interior is fitted with two gallery-floors, an organ, altar-table, and so on. Two carved high-backed chairs by the altar (to the west) are shown as personal relics of the foundress. Outside, by the portico, stood an obelisk to her memory. The obelisk, of red granite, has just been removed to the new site at Lloyd-square. The organ is associated with the memory of Shrubsole, the chapel musician, who composed the air to Perronnett's hymn, "All hail the power of Jesu's name." The quasi-Classic portico, facing to Exmouth-street, is modern, and is not square with the diameter through the doors within. Were it not for the wall windows, the addition of a portico gives to the structure a *faux air* of the Pantheon at Rome. The portico obscures the original semi-circular and embattled entrance which stands out in Hamilton's view. It is inscribed "Spa Fields Chapel, 1779." The area of nearly 43,000 square feet eastwards of the chapel is the old graveyard; and has acquired an unenviable notoriety for the crowded number of interments made therein. The burial-ground marks the site of the pond in the former Ducking Pond Fields. It is stated that heaps of remains were periodically burned in order to find room for additional burials (thus anticipating the necessity of cremation); and that within fifty years as many as 80,000 bodies were laid in a space which should receive 1,400 at most. That nuisance culminated in a holocaust of the year 1845, when the lessees were indicted, and their nefarious proceedings arrested. Containing no tombstones, the graveyard has latterly served for a volunteers' drilling-ground. In August of last year the Marquis of Northampton, as freeholder, permitted the space to be opened by the Metropolitan Public Gardens Association, who, aided by grant from the Lord Mayor's fund, drained and levelled the land. Such a gift to the children of the neighbourhood proves the more valuable in that they are forbidden to make a playground of the recently-opened Wilmington and Northampton squares hard by and on the same estate.

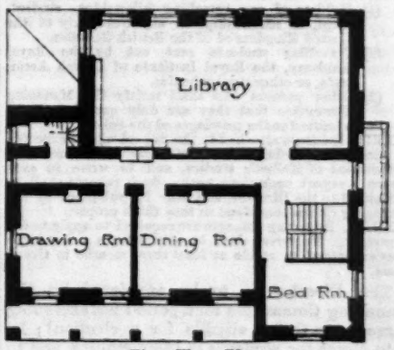
A last service was celebrated in Spa-fields Chapel on Sunday, September 26th last, when Mr. E. J. Bird preached from the text, "Rise, let us be going" (St. Matthew xxvi. 46). The congregation have secured a fresh freehold site by Lloyd-square, Clerkenwell, from the New River Company. On that site has been erected their new chapel, at a total cost of 15,000*l.*, almost entirely defrayed by the proceeds of property devised to them by the late Mr. Oldham, a prominent member of the community. The new chapel, of red brick, with stone dressings, is in the Early English mode, and is nearly octagonal in plan. There is room for 660 seats upon the ground floor, and for 110 in the gallery. The accommodation can be increased to 1,000, by the construction of more gallery seats. In the tower, 100 ft. high, is a muniment-room. Certain rooms for the vestry, the classes, and the committee are provided. A new organ has been presented anonymously. This chapel, on the northern side of Wharton-street, Lloyd-square, was opened for worship on September 29th last, and the former building in Exmouth-street will shortly be pulled down.

* Second son of Samuel Pellew, of Flushing-by-Falmouth, elevated June 1, 1814, Baron Exmouth, of Canonteign, co. Devon, and advanced Viscount Exmouth, September 21, 1816, for his gallant victory at Algiers on August 27 of that year.

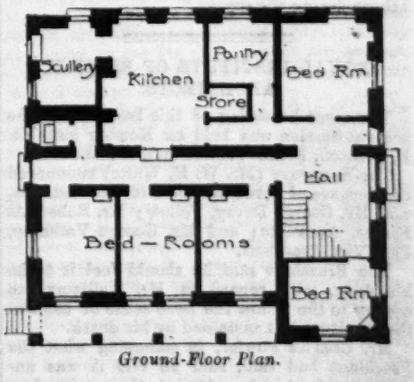
† *Vide* the *Builder*, September 12, 1885, vol. xlix., No. 2,223, p. 348.

THE BRITISH SCHOOL AT ATHENS.

WE give a view of the house erected for the British School of Archæology at Athens, and also the plans of two floors as carried out; there has been some little alteration from the first scheme. The house, as we have before mentioned, was designed and planned by Mr. Penrose.



First Floor Plan.



Ground-Floor Plan.

We have received an early copy of the rules and regulations for the school, which will shortly be obtainable by application to the hon. secretary, Mr. G. A. Macmillan. In these the

The British School at Athens.

objects of the school are clearly defined, and we may quote that portion of the rules which sets forth these definitions:—

"I. The first aim of the school shall be to promote the study of Greek archæology in all its departments. Among these shall be (i) the study of Greek art and architecture in their remains of every period; (ii) the study of inscriptions; (iii) the exploration of ancient sites; (iv) the tracing of ancient roads and routes of traffic.

II. Besides being a school of archæology, it shall be also, in the most comprehensive sense, a school of classical studies. Every period of the Greek language and literature, from the earliest age to the present day, shall be considered as coming within the province of the school.

III. The school shall also be a centre at which information can be obtained and books consulted by British travellers in Greece.

IV. For these purposes a library shall be formed and maintained of archæological and other suitable books, including maps, plans, and photographs."

The following definitions are given as to the qualification for becoming students:—

"XVI. The students shall consist of the following:—

(1) Holders of any travelling fellowships, studentships, or scholarships at any University of the United Kingdom or of the British Colonies.

(2) Travelling students sent out by the Royal Academy, the Royal Institute of British Architects, or other similar bodies.

(3) Other persons who shall satisfy the Managing Committee that they are duly qualified to be admitted to the privileges of the School.

XVII. Students attached to the School will be expected to pursue some definite course of study or research in a department of Hellenic studies, and to write in each season a report upon their work. Such reports shall be submitted to the Director, and may be published by the Managing Committee if and as they think proper.

XVIII. Intending students are required to apply to the Secretary. No person shall be enrolled as a student who does not intend to reside at least three months in Greek lands."

The Director is to be appointed by the Managing Committee for a period not exceeding three years (but is eligible for re-election); he is to direct the students in their studies, and to deliver "at least six free public lectures at Athens during the season."

ROYAL INSTITUTE OF BRITISH ARCHITECTS.

THE second meeting of this Institute for the present Session was held on Monday last, Mr. E. I'Anson, F.G.S. (President), in the chair.

The Secretary (Mr. W. H. White) announced the decease of three members of the Institute, viz., Mr. George Devey, Fellow; Mr. Robert A. Fraser, Associate; and Mr. George Vulliamy, Past Vice-President.

The President said he should feel it to be his duty, with regard to Mr. Vulliamy, to convey to the widow the deep sense of the loss the Institute had sustained by his death.

Mr. Charles Fowler, in endorsing what the President had said, said he felt it was unnecessary for him to enter into the merits of an old friend who was so well known to many in the room.

Mr. Edmund Woodthorpe said that he had known Mr. Vulliamy from his earliest days. As the oldest District Surveyor in the Metropolis, and as having occupied the position of Chairman of the District Surveyors' Association, he (Mr. Woodthorpe) had been brought much into contact with Mr. Vulliamy, whose judgment and capacity, and his genial manner, were acceptable to the whole profession, besides his being a most kind and generous man in his relations with young professional men. Indeed, it would be difficult to find a man with the common sense, judgment, and gentlemanly discretion displayed by their deceased friend to succeed him in the office of Superintending Architect to the Metropolitan Board.

Professor Kerr said that the name of Mr. Devey ought not to be allowed to pass unnoticed, he being a very distinguished artist and a most creditable member of the profession.

Mr. George Aitchison, A.R.A., spoke as to the extreme delicacy of design and the general competence of the late Mr. Devey, whom he had known for over thirty years. At their first interview, Mr. Devey showed him a collection of sketches of old lamps from almost every Continental town, and, later, he had the pleasure of seeing some beautiful works of Mr. Devey's, mainly in Kent, near Lord De Lisle's seat. Everybody who knew Mr. Devey would regret his death, he being not only an architect of extreme diligence, but one whose works exhibited great elegance of detail.

Mr. R. Phené Spiers suggested that when some memoir was written of Mr. Devey, it might be illustrated by a few of the models he had made, and with photographs of several of his buildings, without which it was impossible to understand the power of design and fertility of imagination which characterised all his works.

Prof. T. Roger Smith said he hoped that if a memoir of Mr. Vulliamy was read they might have an opportunity of seeing some of his admirable drawings made abroad, as well as for works at home. Before Mr. Vulliamy became Superintending Architect to the Metropolitan Board of Works he was engaged in practice with his uncle, Mr. Lewis Vulliamy, and made a great many of the drawings for the works carried out by that architect, including those for Dorchester House, Park-lane.

Mr. John Hebb, as one who had been intimately associated with Mr. Vulliamy for the last ten years, said he believed it would be difficult to find a more considerate and gentlemanly man. He began life a great many years ago, and those who only knew him as Architect to the Board of Works were probably not aware that he was an artist of great ability. He began life as an engineer, but that profession not being a congenial one, he was articled to Sir Charles Barry, afterwards making an extensive tour abroad, in Italy, Greece, Asia Minor, and Egypt for three years, drawing and making sketches wherever he went, and measuring a great number of monuments, including those of Carnac and several of the larger temples of Egypt. On returning home he commenced practice, making a very good position for himself, and erecting several remarkable buildings. As Superintending Architect to the Metropolitan Board of Works he also did some things which showed in a marked degree his ability as an artist, notably a group of buildings in Queen Victoria-street, and the lamp standards on the Victoria Embankment. The public had great confidence in Mr. Vulliamy, and those who knew him, and had had business with him, must have been struck with his constant courtesy and his refinement of manner.

Mr. Percy G. Stone read a letter from the Rev. Chas. Voysey referring in eulogistic terms to the late Mr. Devey. He (the speaker) added that he was one of the few pupils Mr. Devey ever had, and hoped they would some day see upon the Institute walls an exhibition of some of his old master's marvellous sketches, as well as photographs of his works.

Mr. Philip Herapath, of Auckland, New Zealand, Fellow, and Mr. William Dunn, Associate, were introduced and welcomed by the President.

The Secretary announced that at the Examination held recently under the terms of the Metropolitan Building Act, the following gentlemen had received certificates of competency to act as District Surveyors in London, viz., Messrs. F. R. Farrow, Henry Blackburn, W. C. Evans, Brooker, S. Whatman, jun., and E. Mountford. At the same examination Mr. John C. L. Bettridge had received a certificate as Building Surveyor under a local authority, being the first candidate who had passed in this new examination conducted by the Institute.

The Secretary, in the absence of its author, M. Paul Sédille, then read a paper entitled "Étude sur la Renaissance de la Polychrômie Monumentale en France." Mr. White explained by way of preface that M. Sédille had been instrumental in obtaining for the Institute certain working drawings by M. Garnier, belonging to the archives of the New National Opera and the French Government, and had also sent some working drawings of his own. The following is an abstract of the paper,—

The ancient and traditional custom of colouring exteriors in France had declined by the reign of Louis XIV. The eleventh-century paintings on the Church of St. Savin, near Poitiers, were the oldest extant in France. Polychromy had been employed very largely in later centuries, and the façade of Notre Dame de Paris still bore traces of paintings, as did also the greater portion of the ecclesiastical edifices of the thirteenth, fourteenth, and fifteenth centuries. The wooden frontages of residences were also painted, while pottery and glazed tiles were encased between the beams.

During the Renaissance, the influence of Italian taste transformed external polychromy; colouring was subdivided and localised, the paintings being often enriched with gilding, marble, and enamels. Terra-cotta and glazed materials were much used. The monuments of those cities famous for the works of Luca della Robbia and his school were the sources of inspiration. Moulded to its own taste by the French Renaissance, coloured architecture appeared less marked at the end of the sixteenth century, and diminished during the seventeenth, although found under new aspects in the half-tile half-stone façades of the Louis Treize period. From this epoch it disappeared almost entirely. With the era of the Grand Roi was inaugurated the solemn architecture imported by the Jesuits and Bernini. French artists, while imitating Italian buildings of the end of the sixteenth century, thought they followed the spirit of ancient Roman art. They restored antique edifices by robbing them of the splendours of their colouring, and reducing them to the bare beauty of form and proportion. This dealt a fatal blow at coloured architecture not only in France but in all those parts of Europe which had any architectural pretensions. During the eighteenth century colour was absent from every architectural conception; the total eclipse of this radiance was a veritable singularity in the historical records of architecture. All ages and peoples had given polychromy a prominent place in architecture. Architecture was the outcome of the great laws and aspects of nature, and was not colour the manifestation of nature? Could one imagine an object without its appropriate colouring? White and black were but light and shade intensified, and used as a setting to convey the full effect of the infinite varieties of colour. It might logically be hoped that colour would reassume over architecture those rights which belonged to it from time immemorial. In the style called "Louis Seize" a few light ornamental paintings vainly attempted to restore colour to the panels of doors and wainscoting. The Revolution, the Directorate, and the Empire for a long time overcame these fancies for colour. The style Impérial, in spite of its pompous stiffness, was, however, not wanting in brilliancy and masterly qualities of composition. Moreover, the art of the First Empire was represented by two talented men,—Percier and Fontaine,—and it might be assumed that, had Percier been less influenced by the taste of the age, he would not have been unmoved by the charms of colour. His design for the interior of a Salle-de-Musée, decorated with ornamental paintings of delicacy and harmony, is a proof of this. During the Bourbon restoration architecture remained stationary, but the Revolution of 1830 signalised the advent of a new era. With the restoration of the souvenirs and monuments of France of the olden time, attention had been called to the arts of the Middle Ages and the Renaissance. The works of Vitet, of Prosper Mérimée, of De Caumont, of Didron, and later on of Viollet-le-Duc, familiarised the public with Mediæval art. Wall paintings reappeared in old buildings freed from the whitewash of previous centuries, and colour, used in interiors, was soon to be produced on exteriors. A succession of important works on ancient art contributed to this return of polychromy. Hittorff was one of the first to search for colour on the monuments of antiquity. Segesta, Selinus, and the temples of its Acropolis, were objects of his studies, when in 1823 he visited Sicily. The results of his observations he had communicated to the Académie des Beaux-Arts in several papers, which created a great sensation. Encouraged by some, violently opposed by others, Hittorff saw his opinions passionately rejected or accepted; but the subsequent labours of the students at the École de Rome proved the accuracy of his theories. In 1851 he published "L'Architecture Polychrôme chez les Grecs," containing a restoration of the temple of Empedocles at Selinus. Hittorff had restored, in like manner, the three temples which stood close to the Acropolis of Selinus. Théodore Ballu and Paccard were the first who left the Villa Médicis to study the ruins at Athens, and in 1845 and 1847 respectively restored the temple of Minerva Polias and the Parthenon, but the colouring was not represented in the bright colours of a newly-finished work. In 1848 Tetaz resumed the studies carried on by Th. Ballu at the Erechtheum, but M. Charles Garnier was the first who displayed, in his restoration of the Temple of Jupiter Panhellenius in Ægina, Grecian polychromy in all its pristine brilliancy of tone. As a reminder, M. Sédille mentioned the works of several other French architects, and among them the restoration of Pæstum by Henri Labrouste. The excavations at Pompeii had periodically brought to light painted apartments. Constant-Dufeux had stated his belief that the Trajan column had at one time been entirely painted. Hittorff set the example of using colour in important works. His *Cirque* in the Champs-Elysées was a valuable testimony to the effects that polychromy could produce. Duban was one of the first to manipulate colour with an exquisite sense of harmony. At the École des Beaux-Arts he produced the "Loggi di Rafaele" in the *galeries*, and decorated the porticos in the Cour-du-Murier with paintings in a Pompeian style. Variegated marbles, glazed tiles, terra cotta, and naked iron had been used by him with truth and logic. Constant Dufeux also produced colour decorations, refined, harmonious, and effective. The diocesan architects sought to restore to the great religious edifices their ancient colouring, and in some cases with success. In the villa Louis Duc had built for himself at Croissy, on a bank of the Seine, the colouring was a distant replete on of Oriental art, and there, both internally and externally, paintings and glazed tiles combined to produce a decorative effect, as cultured as it was refined. After Italy, Greece, and the monuments of the Middle Ages, and the Renaissance, the East had supplied a conclusive argument in favour of coloured architecture, and for some time the East had been invading the West. Colour had extended itself within to without; no longer by superficial coats which would rapidly fade in damp climates, but under the form of coloured materials. The development of ceramics placed at the disposal of the architect, a varied supply of solid materials. The Exposition-Universelle of 1867 gave prominence to the efforts of English and French potters, while the *Azulejos* of the old Spanish monuments, the faïence coatings of the mosques of Cairo and Persia, and the decorations of the Indian palaces, had exercised a sort of fascination easily accounted for. It was necessary to take these circumstances into consideration, in order to understand the marked reaction which then became manifest in favour of bright colouring obtained by the use of natural materials. M. Charles Garnier had introduced mosaics on a large scale in the Nouvel-Opéra, which had been a kind of revelation, and had borne abundant fruit. About 1872, after returning from Spain, M. Sédille himself largely employed terra cotta and glazed tiles, in combination with highly-coloured woods. From that time the use of terra cotta and glazed tiles had become general both in France and England,—indeed, in the latter country the efforts made to utilise the resources of the potter's art dated back to an earlier period. The Exposition-Universelle of 1878 gave a great impetus to the manufacture of ceramics; the façade of the Exposition, and the special pavilion of the Ville-de-Paris, equally attracted attention. As a proof of the renaissance of polychromy, M. Sédille mentioned many works executed in Paris, by Davioud, Ballu, and MM. Garnier, Vaudremer, and others. He, however, urged that it was no longer paintings which, as in the olden time, must constitute modern polychromy; but rather the coloured materials themselves which formed a part of the structure. This art had not, so far, been received with unanimous approval, and all the attempts hitherto made had not been equally satisfactory. But a misconception of colour ought no more to discourage one from polychromy than bad architecture ought to set one against good. Architects should serve a special apprenticeship to colour, study the laws of harmony, fathom its resources, and thoroughly understand the part it played, so as to avoid its abuse. Coloured materials, such as granite, marble, stone, metal, and wood, allied with terra-cotta, enamels, and all the fire-tested products, would render modern polychromy as lasting as the edifices of which it would be one day the inseparable adornment.

Mr. George Aitchison in opening the discussion remarked that M. Sédille was an extraordinary man. He was not only one of the apostles of colour in architecture, but so excellent a landscape painter that his pictures were admitted to the Paris *Salon*. He was a man of such literary power that essays by him have appeared in the *Gazette des Beaux Arts*; he was an architect, and a sort of apostle of the new architecture yet to come, not only in France, but in England and all over Europe. M. Sédille felt that a great portion of the construction of modern buildings must be in iron, he accepted those conditions, and in the Magasins du Printemps* he had endeavoured to bring some of what formed the bulk of the interior structure to the outside. He had tried by only using piers and angles of masonry to show how constructions in iron and bronze could be made, in good proportion, harmonious in point of outline, and beautiful in colour. It must be interesting to all present to hear how the whiteness which at one time overspread everything like a leprosy was gradually being cured. M. Sédille when in this country was delighted to find how advanced English architects were in the use of external colour, and was enthusiastic on seeing in many of our buildings how much use had been made of mosaic on a gold ground, and of enamelled pottery and tiles. One cause, no doubt, of the general prevalence of white in buildings during the last century or so was that the Roman remains had been so bleached by time that the gorgeous colours they once presented were almost gone. Many of the temples, now a dirty white, were at one time blazing with colour, and when one went to Ravenna and saw interiors of tombs and temples covered with mosaic, it was evident that the Romans were by no means such great admirers of white as had hitherto been supposed. Their exteriors were mostly coloured by means of splendid marbles of high tint and polish, and also of bronze and gilding; therefore it ought not to be said of them that they delighted only in proportions shown in white. M. Garnier, in one of his publications, had given a sort of dream of what was in store for Paris, when everybody would have as great an admiration for colour as he himself had, and when the houses would be resplendent with mosaic, polished marble, enamelled terra-cotta, bronze, and gold. M. Garnier also made a charmingly apposite remark on the subject of marble. He said, "Marble, it is true, does not retain its pristine beauty and polish in this damp climate of France; but, however damaged it may become, it has always a superior and cultivated air. It is like a gentleman in a shabby coat; you never mistake him for anything but a gentleman, and he is a very different person indeed from a common fellow in his Sunday best." The members of the Institute were very much indebted to both M. Sédille and M. Garnier for the magnificent specimens of detail working drawings shown upon the screens. He might add that M. Sédille had built several country houses enriched with enamelled pottery. In England, a veritable land of potters, that charming material might well be more employed than it was. He wished to point out the capability of the material, even in country places, for enhancing by a little bit of colour the whole tone of the building. When he was a young man there was a general feeling that statues and buildings ought to be white, and that any kind of colour only spoiled them; but how many things in nature were white? On misty days the whole sky was white; when snow fell the whole landscape was white; but, as a rule, white was used by nature very sparingly, and as a precious thing to give greater emphasis to the colour about it. He did not see, therefore, why men should not go to nature for their colour, as they had gone to her for the delicate proportions, elegant outlines, and the light and shade of her most choice productions.

Mr. H. H. Statham proposed a vote of thanks to M. Paul Sédille for the very interesting and suggestive paper he had sent, and which had been received with the applause always bestowed on recommendations to use colour. Everybody applauded such recommendations, but very few people carried them out, perhaps for want of sufficient encouragement to do so. There were, he thought, one or two points in the paper which suggested question and consideration. Throughout the whole of it, M. Sédille had carefully kept himself to the recommendation of constructive polychromy for external work, and rightly so, for it should be borne in mind that any attempt to apply colour to the exterior of buildings by mere pigment, would not only probably end in a gaudiness of effect, but would

* Illustrated in the *Builder* for Feb. 21, 1885.

also interfere with the monumental and imperishable character always desirable to maintain in any building of importance. With regard to the restorations which had been made, by various theorists, of Greek temples and other buildings, as they were supposed to have been painted, and based simply on the remains that had been discovered, although they might be very plausible, and were, in many cases, no doubt, really something like what had been done, he could not say that they had always impressed him with increased respect for the artistic judgment of the Greeks. If they took even the very moderate examples given by Mr. Penrose at the close of his book, and some also, which, if he remembered rightly, were given by Hittorff,—whose book he was sorry to say he had not looked up for many years,—even if the Greeks did do such things, metopes in strong red and triglyphs in strong blue, it was hardly a style of colour that added dignity or refinement to a building. If works like the Parthenon were really carried out in such colours, it was an indication that even the Greeks were not without their shortcomings. With regard to the painting of the statues in the frieze of the Parthenon, he might remind them of a suggestion from Germany a few months ago, which was published in an English journal, to the effect that the frieze of the Parthenon was not painted in crude and dead colours, but was gilt first and painted on the gilding, so that there was a kind of opalescent effect. This suggestion was stated by the writer to be borne out by the traces of gilding all over some portions of the work. He (Mr. Statham) had looked into the matter, and thought he could see some indication of this on some of the remains of the frieze in the British Museum. At all events, that was a suggestion of the manner in which the frieze might have been painted, a method which would have given much more brilliancy than the mere use of pigments on a dead ground would have produced. With regard to the painting of statues, touched upon by Mr. Aitchison, it ought to be remembered that statues in general, and certainly the Greek statues, were not, strictly speaking, imitations, but idealisations, of nature. They were the representations of ideas shown through natural forms. The nearer the natural colours were arrived at,—and this could never be quite attained, because it was impossible to colour marble so as to produce an optical illusion,—the more would the statue be removed from the realm of idealism and brought down to mere realism. Therefore, he could see no strong objection to statues being pure white. They were not imitations of the natural, but of the ideal, and the efforts made by Gibson, with a very strong belief in the practice of the Greeks, as represented by the works he had left to the nation, were to his mind most unhappy, and constituted a warning rather than an example. He quite sympathised with what both M. Sédille and Mr. Aitchison had said as to the far greater use which might be made of constructive polychromy in durable materials and the employment of those tiles of which there was so large an assortment, and which the French architects in many cases got from this country. In conclusion, he said he could not help thinking that polychromy might be made to bear upon the decoration of the room in which they were assembled, which showed what Mr. Aitchison had called a "leprosy of white" over their heads. The dome and ceiling decoration would really lend themselves happily to colour, and it would be a good practical outcome of M. Sédille's paper if in due time, when funds were forthcoming, they selected the decorator in whom they had the most confidence, and asked him to do a little polychromy for the meeting-room of the Royal Institute of British Architects.

Mr. Henry Dawson seconded the vote of thanks, sympathising, as he did, strongly with the idea of increasing the beauty of our buildings externally, not by the application of any pigment as colouring, but by the use of materials in construction natural in their colour, and, therefore, fairly durable. He would suggest, and especially to the younger members, who were the more likely to build in the future, the desirability of using much more largely than hitherto the various tinted stones that existed even in this country. Some were beautifully coloured, and yet they had been very much neglected. In Northumberland he had lately found new quarries affording admirably coloured stones, which were being used by the North-Eastern Railway in their stations with very good effect. He thought, therefore, it would be well if London architects, where they were able to do so, would make more use of these native stones, which could not fail to materially add to the cheerfulness of the appearance of buildings in the metropolis. Very praiseworthy efforts had been made of late by some architects in London, and he thought this was a step in the direction of carrying out the idea M. Sédille had in introducing colour to the exterior of buildings.

Mr. William Woodward remarked that an excellent example of external polychromatic decoration was to be seen at Messrs. Novello & Co.'s, Newman-street.

Mr. Octavius Hansard said he would warn every one to be guarded in the use of stone from any quarter of these islands until it had been tried in London. It would be a most delightful thing to be able to employ stone from the Northern, Eastern, or Western counties, but woe betide the architect who lived beyond a decade from the completion of his works if he brought these stones into the metropolis.

Mr. John Hebb said he should be sorry to say anything that might offend national susceptibilities, but he could not help remarking that throughout M. Sédille's paper there was a vein of eulogy of his countrymen which was, to say the least, remarkable. It was even more remarkable that that eulogy did not stop there, but was even extended to a considerable number of the architects of this country, though, as a rule, French architects were not very liberal in their appreciation of English architecture. M. Sédille might have been a little more guarded in his praise of the failures of the polychromatic decoration of Mediæval churches in Paris. It did not require any great acquaintance with the subject to pronounce all those attempts to which M. Sédille had alluded, particularly in the case of Notre Dame, St. Germain des Prés, and the Sainte Chapelle, as being conspicuous failures,—failures not, as M. Sédille would have them believe, because they were the results of an imperfect adaptation of a good principle, but because they were endeavouring to carry out something that was impossible. They were really attempts to reproduce an entire scheme of decoration from mere patches of colour, which must be a matter of impossibility.

Professor Kerr said that a specimen of a new material was brought to him the other day, which it might be interesting to refer to in connexion with the present discussion. This was a sample of natural stone glazed by Messrs. Cliff, of Leeds. The question of glazing stone had for a long time been before the minds of inquirers, with the view to enabling a building to keep itself clean by means of the rain. The merit of the contrivance was that although the glaze was effected by the ordinary means of producing a pottery glaze, it was put on to the stone, as he understood, at such a low temperature as not to injure the stone. If he was rightly informed, the glaze was accomplished by a portable oven which could be fixed on any building works in progress, and the stone as it was dressed could be glazed before being laid. If there was anything in the invention, and if the glaze could be modified a little so as not to be too glaring, the introduction of the various stones of the country, which Mr. Hansard was so afraid of bringing into London, might be accomplished with greater confidence of success, because in every case, not only was the surface protected against the weather, but the colour was brought up, and from the different tints of freestones a very excellent polychromatic effect might be produced.

Mr. J. D. Crace thought it was most interesting to have heard, summed up in a few words, the history of the advance of polychromatic treatment in France, and particularly during the last fifty or sixty years. Mr. White, before reading the paper, had pointed out a few of the drawings which he (Mr. Crace) had sent to illustrate M. Sédille's remarks, and he ought to explain that they now appeared on the Institute walls for the second time, after an interval of more than forty years. They were prepared for the illustration of three separate papers by his father, in 1843, 1846, and 1848, with the express object of calling the attention of the Institute to the progress of polychromy abroad. One was an interesting example of polychromy which had been executed at Munich about 1840, and which was illustrated by some of the drawings referred to. One speaker had reverted to the unfortunate decoration of Notre Dame, but he had not followed M. Sédille in the sense of praising that work. Allusion had been made in the paper to the external decorations of the Trocadéro buildings, and any one who examined them carefully could not fail to be struck with the great amount of thought and delicacy they exhibited. They were in mosaic, introduced with great moderation, but with much effect, and he was pleased to be able to praise them, because he was not so well satisfied with the internal as with the external decoration. One could not help also being struck with the great refinement, and the careful thinking-out of all the colour applied to Parisian buildings of any importance. As to the colouring of statues, he would be sorry to enter upon the thorny controversy as an advocate for or against the practice. No doubt, colour was used on the sculpture of the ancients, but whether with advantage or not he was not prepared to say.

Mr. R. Phené Spiers thought that the subject divided itself into two considerations, first as to the remains of colour on ancient buildings, and, secondly, what would be the advantage of adapting it to our present buildings. As regarded the remains of ancient colouring on buildings, it was not exactly fair to judge them from the drawings which had been published in various works. He quite agreed with Mr. Statham that the bright-coloured metopes and triglyphs shown in the drawings of Mr. Penrose's book were somewhat disagreeable; but it must be remembered that those drawings had a partial glaze which probably was not the case in the buildings themselves when coloured. Again, one looked at the drawings by the dim light of this country, while the buildings were lighted up by the brilliant sun of the East. The Egyptian buildings still retained their colour, and preserved the same brilliance which, as far as one knew, they originally possessed, but without that crudeness which they appeared to have in the drawings. He had no doubt in his own mind that the Parthenon must have been brilliantly coloured, or it would have been impossible to see it. The Walhalla, a building erected at Ratisbon, in imitation of the Parthenon, and in the same material, was uncoloured, and even under a bright German sun it was almost impossible to look at it. So great was the glare of the light on the white marble that the intense brilliancy of the object prevented its form being seen. It was evident that it would be useless in Greece to erect a building of the proportions of the Parthenon if it was impossible to look at it; therefore there must have been some colour upon it. With regard to the application of colour nowadays, there was one central point to be borne in mind, viz., that a very brilliantly-coloured object in this country, and especially in London, was far from agreeable, and that nature always insisted upon toning it down until it became more in harmony with our skies. As an instance, he cited the Buxton Memorial Fountain, at the corner of Great George-street, Westminster, which was constructed in bright washable materials, but it always looked too glaring after its periodical cleansing. As soon as a brilliantly-coloured or glazed surface was put up in London it was out of keeping with the climate, and therefore it was wrong to use it.

Mr. Sydney Vacher referred to what South Kensington was doing for colour by sending students to Italy, and having models constructed of whole compositions. He believed it would be a great thing if the Institute could do something in the same direction.

The President said he thought the meeting might be congratulated on having heard M. Sédille's instructive and agreeable paper, and the practical and learned remarks it had elicited. In addition to the vote of thanks to M. Sédille, he would also convey the acknowledgments of the Institute to M. Garnier for lending them his excellent drawings.

The resolution was then carried by acclamation.

The President further intimated that the next meeting would take place on the 6th proximo, when a paper in English, by Signor Giacomo Boni, of Venice, Hon. Corr. Member, would be read, entitled "The Ca d'Oro and its Polychromatic Decorations."

The Will of Sir John Kelk.—The will of Sir John Kelk, who died on the 12th of September last, has been proved, the personalty being sworn as of the value of 408,352*l.*

THE INSTITUTION OF CIVIL ENGINEERS.

THE PRESIDENT'S ADDRESS.

At the opening meeting of the session, held on Tuesday, the 9th inst., Mr. Edward Woods, President, delivered an address, in which he stated that his connexion with the profession dated from the time when he entered the service of the Liverpool and Manchester Railway Company, so that he had had an opportunity of observing the gradual and progressive development of the railway system,—of the steps by which that system of inland transport had attained its present degree of perfection. The Liverpool and Manchester Railway without doubt afforded the pattern and example upon which (with such modifications as the experience of the first few years of its working suggested) its immediate successors were designed and framed. That line was originally laid with so-called fish-bellied rails of 35 lb. per yard, resting in iron chairs, supported on stone blocks wherever solid ground permitted their use. Wooden sleepers were only used as a temporary measure, where the road was on embankment, or on soft moss, and simply as affording ready means of lifting and adjustment until the bed had become consolidated. So much importance was at that time attached to the provision of a firm and rigid foundation for the rails, that George Stephenson took advantage of the rocky floor of the Olive Mount cutting, near Liverpool, to form a bed on which the chairs should directly rest. Again, Jesse Hartley, the Engineer to the Liverpool Docks, when he commenced the Bolton and Manchester Railway, carried out to a large extent the system of building up from the ground level solid stone walls on which to rest the rails. Mr. Brunel, preferring timber supports for the Great Western lines of rail, began by driving piles to carry the longitudinal half-balks of timber, on which were placed bridge rails. All these methods were found, from one cause or another, to be defective; and, chiefly by reason of injury done to the rails through excessive rigidity, had soon to be abandoned. On the Liverpool line the increasing weights of engines and speed of travelling soon necessitated a more substantial roadway, and led to the ultimate relaying, in successive portions, of the entire road, first with rails of 50 lb., then of 62 lb., and afterwards of 72 lb., and finally of the still heavier type now in use, made latterly of steel instead of iron. The fish-bellied form was superseded at an early period by a rail of uniform section throughout, an improvement resulting partly from the experience of a sample piece of the line so laid, and partly from the conclusions arrived at by Mr. Robert Stephenson in determining the form to be adopted for the London and Birmingham Railway, after an exhaustive inquiry, conducted by the late Professor Barlow, at the instance of the Board of Dirsctors of that railway. Mr. Locke had elected to adopt a similar form of rail for the Grand Junction Railway, and to lay the entire line on wooden sleepers. Since then stone blocks had been almost universally abandoned, as it was seen that, although wood was of a perishable nature, its elasticity, and the facility which it afforded for repairs, materially diminished the cost of maintenance, and contributed greatly to relieve the rolling-stock from the shocks and jars it encountered in passing over a rigid road. The same considerations led to the general adoption of the compressed wooden key in preference to the iron key for securing the rail to the chair. These variations, together with the subsequent application of fishing the joints of the rails, and the substitution of steel for iron, were embodied in, and constituted, the accepted practice of the present day. Cast-iron sleepers had been used somewhat extensively on foreign lines, but it was not improbable that ere long steel sleepers might take the place of these as well as of wooden ones; and already such were coming into use on several of the leading trunk lines in England as well as on the Continent, whilst large quantities were exported to India, where, in addition to their other qualities, they afforded exemption from the attacks and ravages of the white ant. Generally the substitution of steel for iron rails had been attended with most beneficial results to all railway companies, a change which was rendered possible by the inventions of Sir Henry Bessemer and of the late Sir William Siemens, and by the keen competition of manufacturers. Within a recent period contracts had been made for steel rails of heavy double-headed section, delivered free on board, at less than 3*l.* 10s. per ton, whilst in 1870 the market price of iron rails of similar type ranged as high as 7*l.* 10s. per ton, steel rails then ruling at 10*l.* per ton.

The President then proceeded to observe that the most advanced type of locomotives of the present day retained the essential characteristics of those which held the field at the commencement of the era to which he had referred. The important features common to both included the water-surrounded furnace chamber,—the multitubular boiler,— the wheels mounted either on crank or on straight axles, whether single or coupled, driven by a pair of horizontal or inclined cylinders, the smoke-box, and the steam blast to intensify the draught. Great improvements, it was true, had been effected in most, if not in all, constructive details, whilst the progressive increase of traffic called for a corresponding augmentation of the power necessary to haul the trains. Hence the locomotives of the present day possessed, as a rule, at least four times more steaming power, coupled with six-fold weight, than those of the class represented by the "Planet," the approved type of the period from 1832 to 1836. Contrasting the two types, the approximate comparison as regarded weight was as 7½ tons to 45 tons; as to firegrate area, as 7 square feet to 20 square feet; and as to heating surface, as 300 square feet to 1,400 square feet. Inclines which at one time were regarded as too formidable to be worked advantageously by locomotives, were readily surmounted by the powerful engines of the present day. Hence gradients of 1 in 50 and 1 in 60 were common on many railways, whilst important lines, ascending and crossing mountain ranges in different parts of the world, had continuous ascents of many miles in length of 1 in 25, 1 in 30, 1 in 33, &c., worked by engines differing only from such as were common in England in the circumstance of greater dimensions and capacity, and adjusted so that the weight on the coupled wheels should be sufficient for the utilisation of the tractive force they were designed to put forth. The limit of inclination admitting of being surmounted by locomotives appeared to be practically reached at the figure of about 264 ft. to the mile (1 in 20); for beyond that limit the weight necessary to be given to the engine to procure adhesion absorbed, by reason of the gravity of its own mass, the greater part of the power it was competent to exert. Resort must then be had either to the stationary engine and rope, or to one or other of the systems which had within a recent period been reintroduced, and which were next alluded to.

The President in a subsequent portion of his address dwelt upon the progress of railway enterprise in the British colonies, as one of the most important factors contributing to the promotion of their wealth and comfort, and to the furtherance, not only of their own commercial industries, but also those of the empire as a whole. In this connexion he dealt successively with Canada, New South Wales and Victoria, Queensland and South Australia, Western Australia, New Zealand, Tasmania, the Cape of Good Hope, Natal, Ceylon, the West Indies, &c. It was to be regretted that, on the initiation of railways in the continent of Australia, the question of the adoption of a standard gauge, applicable to all the colonies, should not have been considered and determined by common consent. Whilst the three colonies of New South Wales, Victoria, and Queensland commenced their railway history nearly at the same time, each adopted a gauge differing from the others,—New South Wales the standard English gauge of 4 ft. 8½ in., Victoria one of 5 ft. 3 in., and Queensland a gauge of 3 ft. 6 in. South Australia had adopted two gauges, viz., 5 ft. 3 in. and 3 ft. 6 in., and Western Australia 3 ft. 6 in. Victoria had subsequently adopted, in the case of some of the branches, the gauge of 3 ft. 6 in. The want of uniformity between the gauges of the several colonies would in course of time, no doubt, be severely felt in the restriction of traffic and increased cost of working when contact was made between these systems. The extent of the colonial railways now in operation, and to which reference had been made, amounted to nearly 21,000 miles, carried out partially by private enterprise, but mainly as Government undertakings. From the latest returns it would appear that the population of these several colonies amounted to, in round figures, 14,000,000. It would, therefore, be seen, though the railway-mileage was small in respect of area of territory, it was very large when considered in respect of population, the accommodation afforded being about 1 mile to every 650 persons, as against 1 mile to 1,925 persons in the United Kingdom.

The address concluded with a brief account of the irrigation works now in progress in the Nile delta, under the direction of Colonel Scott Moncrieff, R.E., the Inspector-General of Irrigation. It would be remembered that the great weir spanning the Damietta and Rosetta branches at the apex of the delta (commenced in 1847 and completed in 1862), intended to hold up the waters of the Lower Nile some 4½ mètres, and to divert them for irrigation purposes into the great system of canals which watered the adjoining provinces, failed through alleged defective foundations, and was found to be valueless except for the regulation of the flow of water into the two branches of the river. The cost of its complete restoration or reconstruction was estimated to exceed a million sterling. The work accordingly had been postponed as being beyond the financial resources of the Government. Colonel Scott Moncrieff, however, believing that the foundations of the weir might be trusted, came to the conclusion that it could, at a comparatively small expense, be so far strengthened as that, with the aid of some subsidiary works, and notably the construction of a second dam, it might eventually be made capable of holding up 4½ mètres of water, in two drops of 2¼ mètres each, thus securing a water-surface never lower than 14 mètres above sea-level. Accordingly the closing of the Damietta branch, which theretofore had not even been supplied with gates, and the strengthening of the foundations and floors of both weirs, and the construction of a second bar of rough stone on the floor of the dam, so as to distribute the pressure of water by creating two drops instead of one, and removed when the river began to rise, had been so successful as to hold up 3 mètres of water during the low Nile seasons of 1885 and 1886 at a cost of less than 50,000*l.*, whilst attention had been bestowed on the details of water distribution. A temporary dam had also been thrown across the Nile below Benha, and two others above Rosetta, so as to allow as little as possible of the precious water to escape into the sea. By these operations 90,000 acres of land had been brought under cultivation, and a tract supplied with water during the summer months which never received it before.

CONCRETE IN HARBOUR CONSTRUCTION.

At the ordinary meeting held on Tuesday evening last, the President in the chair, six papers were read on "Concrete as applied in the Construction of Harbours," at Greenock, Girvan, and Quebec; Colombo, Newhaven, Wicklow; Fraserburgh, Sandhaven, and Portsoy; and Lowestoft; by Messrs. Kinipple, Kyle, Carey, Strype, Willet, and Langley, MM. Inst. C.E.

Mr. Kinipple, in his paper on "Concrete Work under Water," described the methods he adopted for depositing partially-set or plastic concrete under water at various harbour works, having found that plastic concrete, when sufficiently set to resist the action of a current of water, was capable of uniting into a solid mass under water, though deposited in separate lumps. At Greenock the concrete was deposited behind sheet-piling, in depths of from 8 ft. to 38 ft. At Girvan, a pier and quay-wall were constructed of plastic concrete, deposited behind a facing of small dovetailed concrete blocks grouted together at the joints; and a concrete groyne was formed under the shelter of a movable wrought-iron shield. The head of the Wick Pier was rebuilt with blocks of plastic concrete of 60 to 140 tons, formed *in situ* under the protection of sail-cloth. Quay-walls were constructed at Quebec Harbour of crib-work filled with plastic concrete, the cribs being floated into position and sunk on bearing piles. Some experiments showed that cement grout, poured down pipes, could unite shingle, 20 ft. under water, into a solid mass; and this method was successfully adopted for filling up the fissures and open joints in a graving dock at Greenock, which had given great trouble with leakages. The paper concluded by descriptions of novel expedients which the author proposed for the construction of breakwaters in concrete with little plant, and independently of the state of the weather.

Mr. Kyle, in his paper on the "Colombo

Harbour Works, Ceylon," described the various stages by which the western breakwater, 4,212 ft. in length, was constructed, from Custom House Point, for sheltering a water-area of 502 acres at low-water. The works were commenced in 1874 and completed in 1885, at a total cost of 705,207*l*. The breakwater was formed by laying sloping courses of large concrete blocks, by means of a travelling Titan, on a rubble mound previously deposited from an 80-ton steam hopper-barge and levelled by divers. The Titan could carry a load of forty tons on an overhang of 28 ft., and cost 5,562*l*. The first 1,326 ft. of pier, 50 ft. wide, consisted of two walls with an intermediate hearting of rubble; but the rest of the pier was built solid, 34 ft. in width, with four or five courses of blocks, weighing from 16½ to 31 tons each. The foundation of the pier increased in depth from 13 ft. below low-water, near the land, to 23 ft. 9 in. at the head. Each row of sloping blocks was connected with the adjacent ones by filling the joggle grooves, left between each row, with concrete in bags; and the pier was capped all along the top with concrete-in-mass. The pier-head was built of concrete-in-mass, the lower portion being deposited inside a circular wrought-iron tank; and it was surmounted by a concrete lighthouse 36 ft. 6 in. high. Twenty-five steamers of the largest class could moor in depths of from 26 ft. to 40 ft. in the harbour; and there was room, at low-water, for a large number of vessels drawing from 6 ft. to 26 ft. The works were designed by Sir J. Coode, V.-P. Inst. C.E., and carried out by the author.

Mr. Carey commenced his paper on "Harbour Improvements at Newhaven, Sussex," by a history of the successive improvements effected from 1767 down to the commencement of the new works, begun in 1878. These new works, of which he was the resident engineer, and Mr. Banister, M. Inst. C.E., the Engineer-in-Chief, consisted of a curved breakwater, 2,800 ft. long to form an outer harbour, and to protect the entrance to the river, constituting the old harbour; the rebuilding of the entrance piers, and widening the waterway between them; the erection of a new quay on the eastern side of the river; the construction of a sea-wall along the shore; and dredging in the river and the approach channel in the outer harbour. The western sea-wall was commenced first, and was formed of concrete deposited within framing, with a hard skin of cement-charged concrete on the face to withstand the attrition of the shifting shingle beach. The breakwater was begun in 1880, and consisted of a monolithic mass of concrete raised, from low-water, on a foundation of concrete sack-blocks, weighing 100 tons each, deposited transversely in layers by a special steam hopper-barge. A concrete mixing-machine was designed by the author and Mr. Latham, which measured, mixed, and delivered 100 tons of concrete in twenty minutes for filling the bags; and, besides securing a more uniform mixing, it effected a great economy in time and cost. A portable continuous-mixing machine was also designed, capable of delivering 70 cubic yards of concrete per hour into the timber framing, erected on the top of the bag-work, for the construction of the portion of the breakwater above low-water in lengths of 40 ft. By this means, 300 lineal feet of superstructure were erected in three months. A gallery, raised above the quay-level on the western side of the breakwater, provided protection to the quay and a sheltered access to the extremity of the breakwater; it was mainly built of concrete *in situ*. A lighthouse was built of plastic concrete *in situ*, on a pile-work foundation, at the extremity of the west pier. The total expenditure on the whole undertaking, including land, two short railways connecting the works with the London, Brighton, and South Coast Railway, dredging, and various other works, was 463,000*l*., out of which the works described cost 254,000*l*. When the works were suspended in 1885, 1,482 ft. of the breakwater had been completed, and 300 ft. of foundations laid in advance, and a dock of 24 acres, which formed part of the scheme, had not been commenced.

Mr. Strype, in his paper on "Wicklow Harbour Improvements," described in detail the methods he adopted in the construction of a breakwater, 750 ft. long, for sheltering the mouth of the river Leitrim, and the improvement in depth of the entrance channel to the port. The breakwater was built solid, of concrete deposited *in situ*, and, starting above low water, extended into a depth of 18 ft. at low water spring tides, being founded partly on rock and partly on marl. Staging was erected in advance of the work, secured at the bottom with shoes of concrete round the piles, and carrying two lines of railway on the top, along which the Titan and crane for depositing the concrete ran. At first, panelling was employed, reaching down to the bottom, for protecting the concrete carried up in layers inside it; but subsequently a large central mound of concrete was deposited under water, by means of skips, on which the panelling was erected, which reduced the exposure of the panelling and facilitated the progress of the work. Divisions were left at intervals in the work, increasing in number in the upper part, to prevent irregular cracking. Richer and finer concrete was placed in the face near low-water level; rubble was not used below low water, and it was kept away from the face above, as its projections caused eddies and consequent disturbance of the concrete. The total expenditure on the breakwater, steam-packet pier, and dredging, including cost of land, amounted to 40,000*l*. Ordinary plant sufficed for the work, which consisted of huge masses of concrete, resting uniformly on the most irregular bottom, and secure from the attacks of the sea on account of their size. The author considered that a larger central mound might be adopted with advantage, thus reducing still more the amount of panelling required.

The new works carried out at Fraserburgh, Sandhaven, and Portsoy, as well as the previous condition of these harbours, were described by Mr. Willet in his Paper on "The Fishing-Boat Harbours on the North-East Coast of Scotland." The works at Fraserburgh consisted of a breakwater, 860 ft. in length, for sheltering the entrance to the basins, and the widening of the old Balaclava Pier. The breakwater, 30 ft. wide, extending into a depth of 19 ft. at low-water, was built below low-water with bags of concrete, of 28 to 50 tons, deposited from a hopper-barge. Above low-water, the concrete was tipped from wagons into a framing up to quay level; and the parapet was formed by filling the framing with concrete from tipping-boxes lifted by a derrick crane on an overhead traveller, which was also used in erecting the frames. The Balaclava East Pier was widened 16½ ft. on the sea side, along its whole length of 1,400 ft. with solid concrete, which protected the old dry-rubble wall from the sea; and as a parapet was raised 9½ ft. on its outer side, and 19 ft. above high-water, like the parapet on the breakwater, an additional protection was afforded to the quay, and an increased shelter to the harbour. The widening of the pier was commenced at the end of 1875 to provide a roadway to the breakwater without interference with the quay space; and the breakwater was begun in 1878, after the completion of the widening, and was finished in 1882. The average yearly rate of deposit of concrete was 8,000 cubic yards; and under favourable conditions, 400 cubic yards could be deposited in a day. The concrete in the pier cost 17s. per cubic yard, and in the breakwater, 26s. 5d. in bags and 19s. 5d. in frames; and the total cost of the works was 69,000*l*. Some damage was done to the breakwater, after its completion, owing to defects in the method of construction; and the pier was somewhat abraded by the shifting shingle along its sea face. These damages were repaired at a cost of 1,184*l*. A new pier, 1,395 ft. long, was erected at Sandhaven to increase the accommodation in the harbour by enclosing a water-area of five acres. The pier was mostly built between walls of concrete, deposited from barrows within framing, with intermediate hearting, resting on rock; and where the bottom was clay, a concrete toe was added. An exposed portion of the outer arm was made of solid concrete. The average cost of the concrete was 18s. per cubic yard; and the total expenditure on the works, including deepening the harbour, was 17,500*l*. The piers of dry rubble masonry protecting the east harbour of Portsoy having been damaged by the sea, rendering the harbour useless, their repair was undertaken in 1882. The piers were reconstructed and extended in solid concrete, deposited within framing from an overhanging crane resting on staging, at an average rate of 60 cubic yards in a tide. The works were completed in eighteen months, at a cost of 9,000*l*. The author considered that the proportion of 1 part of cement to 9 parts of gravel and sand, adopted for concrete at Fraserburgh, was too weak, and that the proportion of 1 to 6, adopted by him at Sandhaven and Portsoy, formed concrete of more suitable strength for such exposed works.

Mr. Langley, in his paper on the "Lowestoft Harbour Works," described the works carried out by him for forming a new basin of ten acres, along the foreshore to the north of the harbour, excavated to a depth of 14 ft. at low-water. The west quay was built, up to low-water, by sinking thirty-eight hollow rectangular monoliths of concrete, 18 ft. long and 10½ ft. wide, to a depth of from 7 ft. to 9 ft. below the bottom of the basin. The hollow blocks were built up within framing, on a wedge-shaped cast-iron shoe. The block was gradually sunk by excavating inside it; and its descent was guided by long hanging bolts at each corner. The blocks were connected together by passing iron rails through two holes left in the adjacent sides of each block, and filling up the intermediate space between the blocks with concrete; the well inside was also filled with concrete. A block, 21 ft. to 23 ft. high, was sunk in forty-two days; and the block foundation cost 30s. per cubic yard, or 45*l*. per lineal yard. A concrete quay-wall was built, from low-water, on the top of the blocks, 13½ ft. high, and 8½ ft. wide at the base. The eastern and northern sides of the basin were enclosed by embankments surmounted by a wall of concrete-in-mass. The excavations were effected by excavators, steam grabs, and a Bazin sand-pump dredger, which latter raised and delivered an average of 1,000 tons of sand and gravel per day. The works were completed within twelve months, at a cost of 60,000*l*.

LECTURES AT SOUTH KENSINGTON.

Miss Jane E. Harrison is again lecturing at the South Kensington Museum, this time on the "Myths of Attica," a further development of the subject of her lectures at the British Museum on the text of Pausanias's "Attika." Miss Harrison had given in these a graphic sketch of ancient Athens, dealing in detail with its streets, temples, and monuments, leaving the legends comparatively untouched; but in her Wednesday lecture she began a detailed account of that mythology of Attica which gave rise to so many cults, and which decided not only the building of temples, but often dictated their shape and distribution, as in the case of the Erechtheion. Miss Harrison passed over the very earliest legends, of which we have scant literary and no artistic record, and made the earth-born serpent-king, Kekrops, and his successor, the likewise earth-born Erichthonios, the central point of her lecture. Kekrops, with his serpent tail, is the emblem of the pride with which the Athenians regarded themselves as being home-born, indigenous, sprung from their own soil. In his reign took place the contest of Athene and Poseidon for the land of Attica. This contest Miss Harrison illustrated by a vase, familiar to those who have heard her lectures on the Parthenon, the late but beautiful *kalpis*, found at Kertsch, and now in the Hermitage of St. Petersburg. An interesting terra-cotta plaque, found near the bed of the Ilissos, and now in the Berlin Museum (there is a cast in the Cambridge Museum), illustrated the birth of Erichthonios. A cylix from Corneto, also in Berlin, showed the same scene in a style of art more advanced; and two other vases illustrated the confiding of the Erichthonios by Athene to the daughters of Kekrops, with the strict charge that they should not open the chest he was shut in, and the betrayal of the charge by the Aglauros and Herse. Pandrosos alone of the three sisters remained faithful, and to her was dedicated a shrine in that Erechtheion which Erichthonios, when he became king, erected in honour of his foster-mother Athene. In this building were shrines, not only of Athene, but of Poseidon, who had contested with her for the lordship of the land, and the lesser shrine of Erichthonios himself. As in the Iliad lectures, given at this time last year, Miss Harrison not only treats of the development of the myths in art, pointing out on occasion how they deviated from the literary tradition, but she gives her audience a real insight into the spirit that actuated Greek workmanship, and the laws that governed the composition of a subject in vase paintings. It is interesting to hear that the lectures are being largely attended by students from the South Kensington Art Schools. The audience is large, and the arrangements for the lecture admirable in every way. The illustrations are, as before, shown by means of the oxy-hydrogen light.

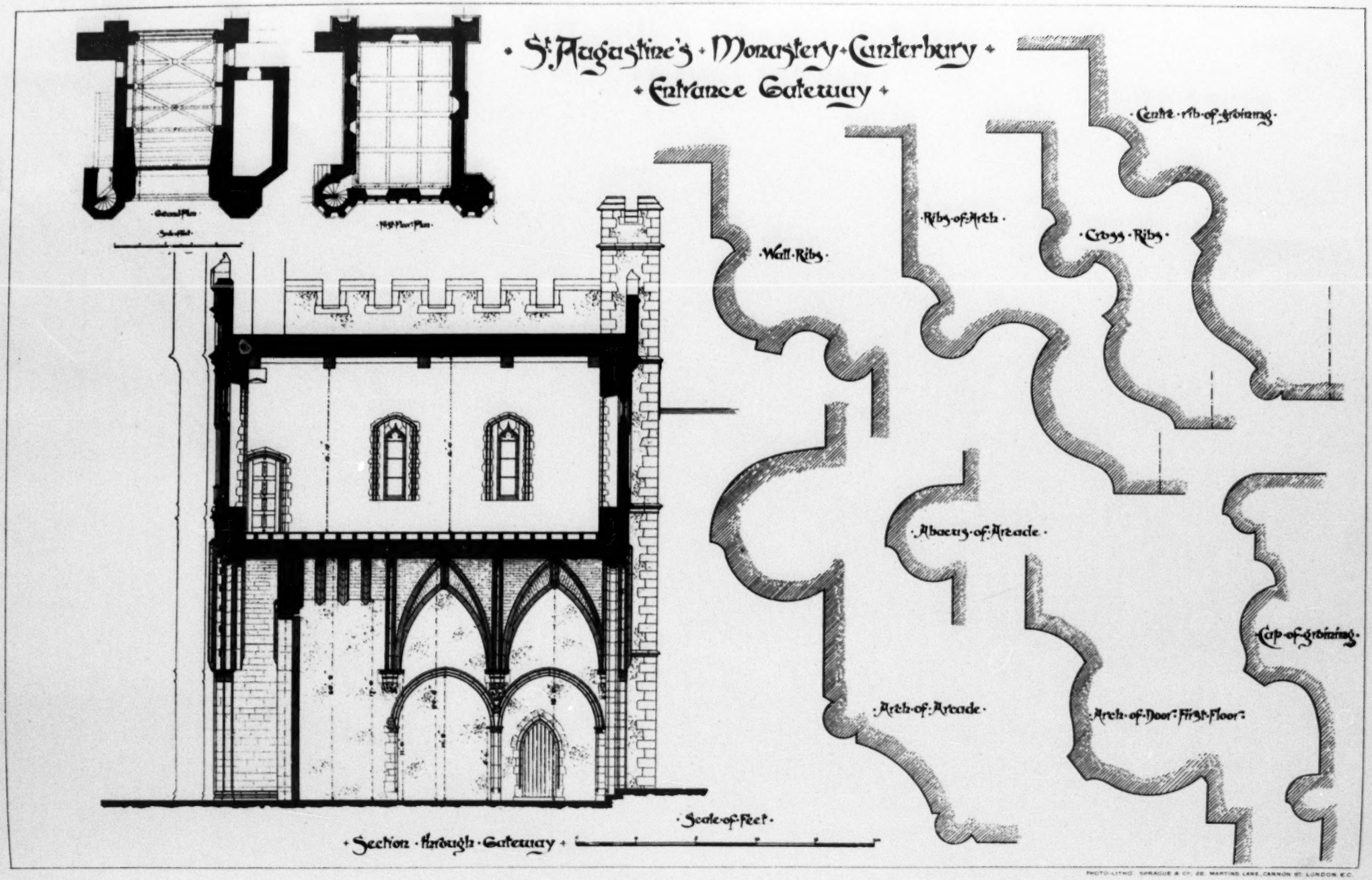


PHOTO-LITHO SPRAGUE & CO. 20, MARTINS LANE, CANNON ST. LONDON, E.C.

ST. AUGUSTINE'S MONASTERY, CANTERBURY: ENTRANCE GATEWAY.—Drawn by Mr. H. J. White.

Awarded the Architectural Union Company's Prize, 1886.

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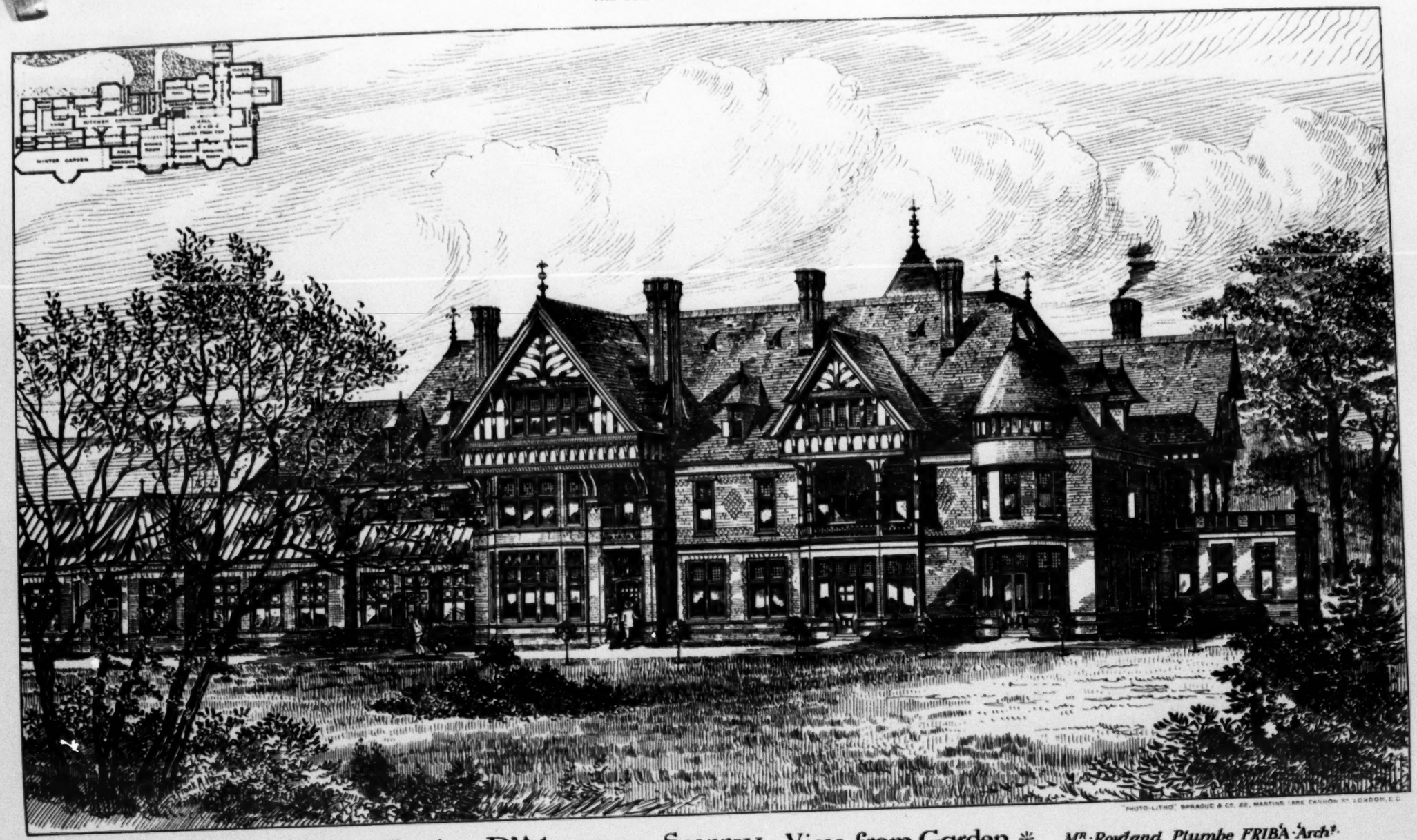


"PHOTO-LITHO" SPRAGUE & Co. 22, MARTINS LANE CANNON ST. LONDON, E.C.

*Woodlands Park · Stoke D'Abernon · Surrey · View from Garden *

Mr. Rowland Plumbe FRIBA. Archt.

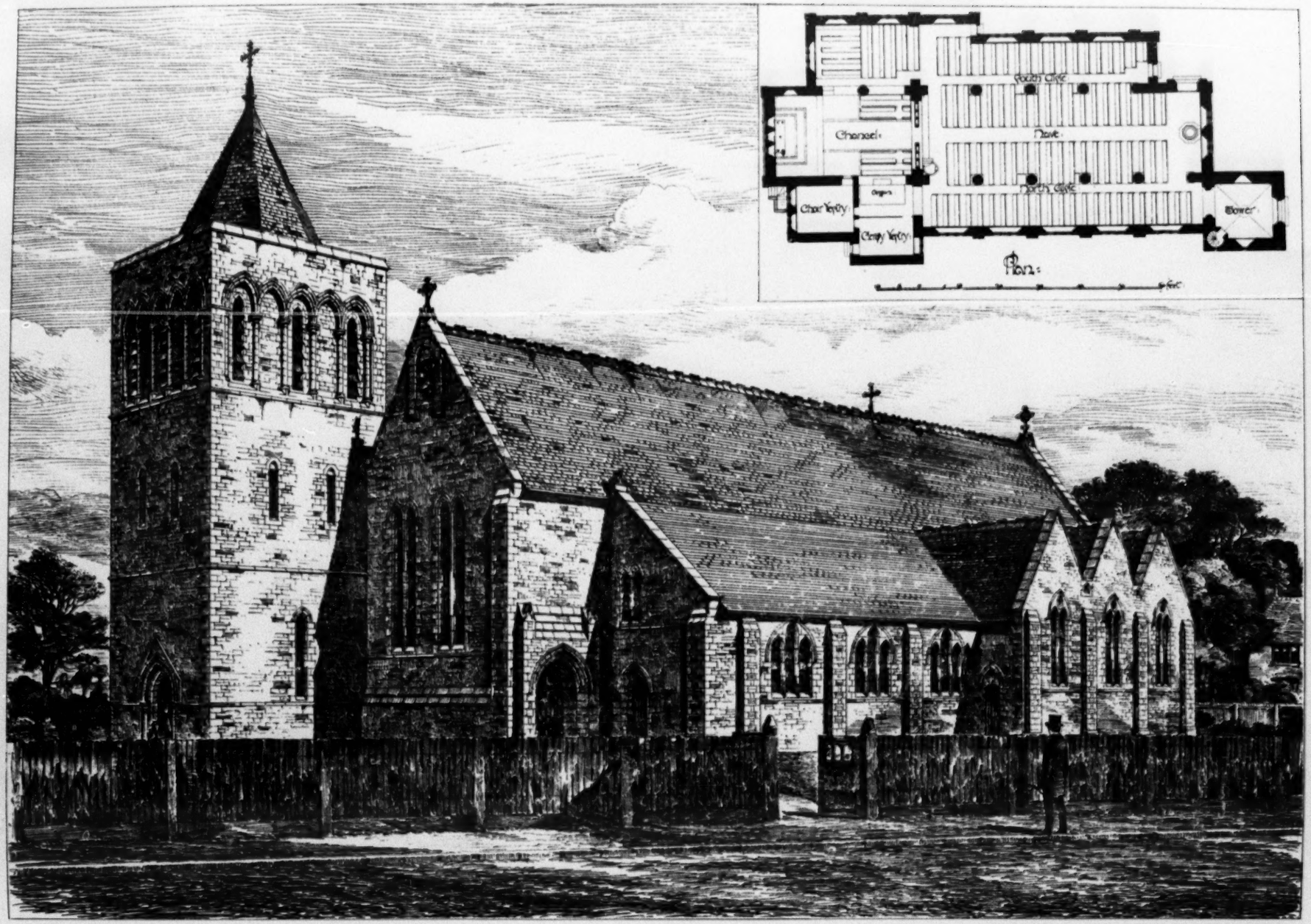
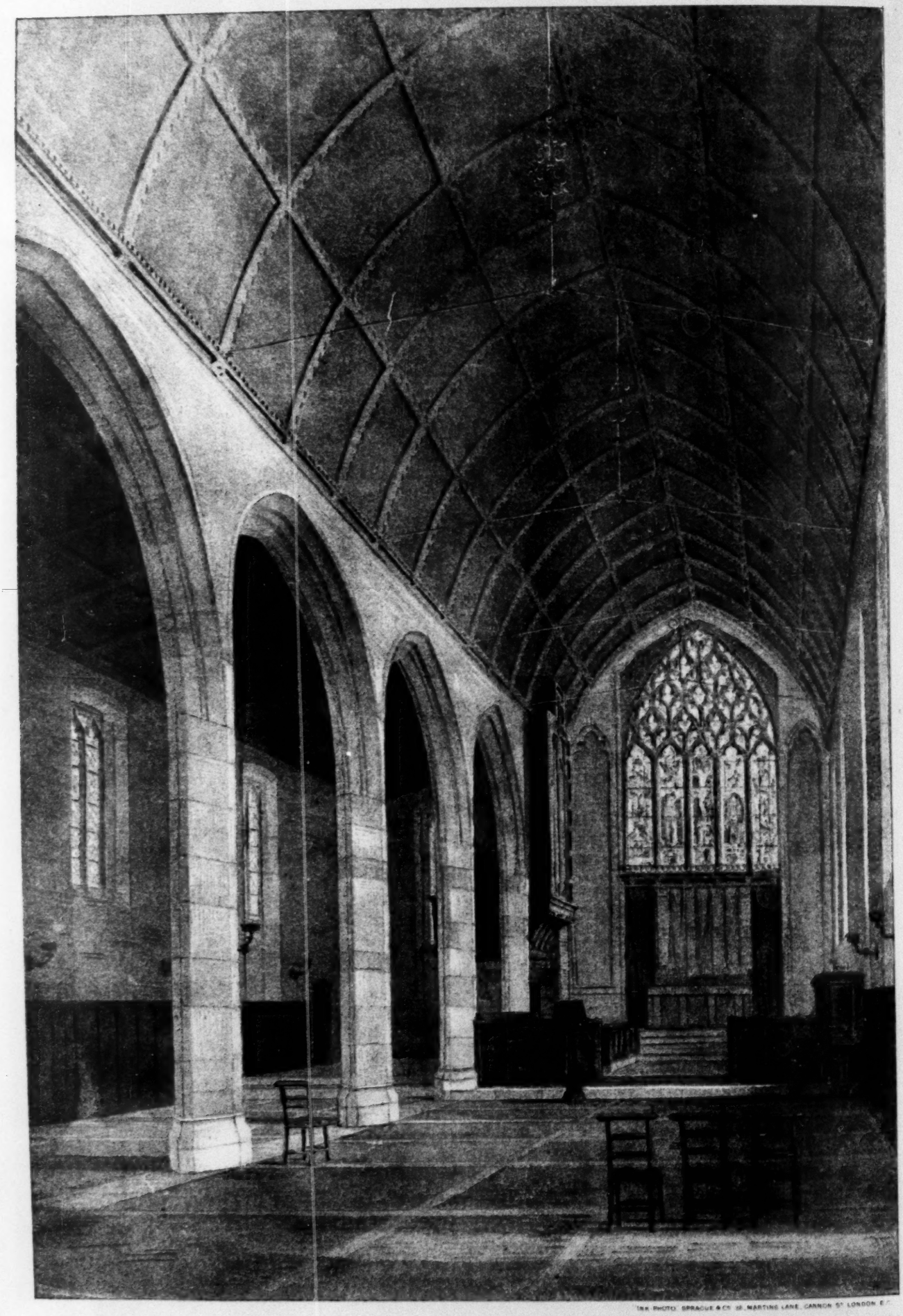


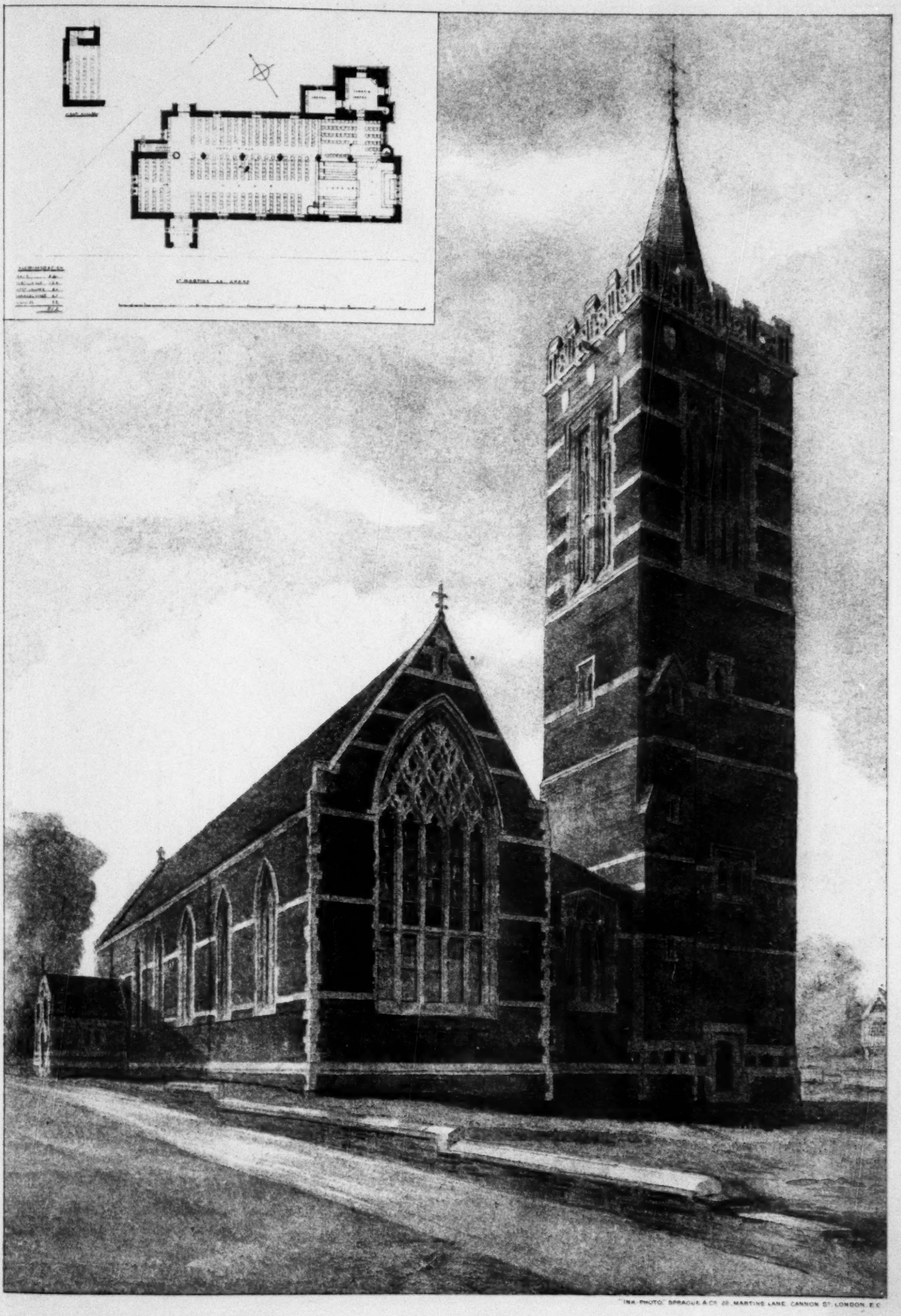
PHOTO-LITHO. SPRAGUE & Co., 22, MARTINS LANE, CANNON ST. LONDON, E.C.

COMPETITIVE DESIGN FOR ALL SAINTS CHURCH, PETERBOROUGH.—Mr. J. Martin Brooks, A.R.I.B.A., Architect.



[Ink. Photo: Sprague & Co. 35, Martins Lane, Cannon St. London E.C.

SELECTED DESIGN FOR ALL SAINTS CHURCH, PETERBOROUGH: INTERIOR VIEW.—Mr. Temple L. Moore, Architect.

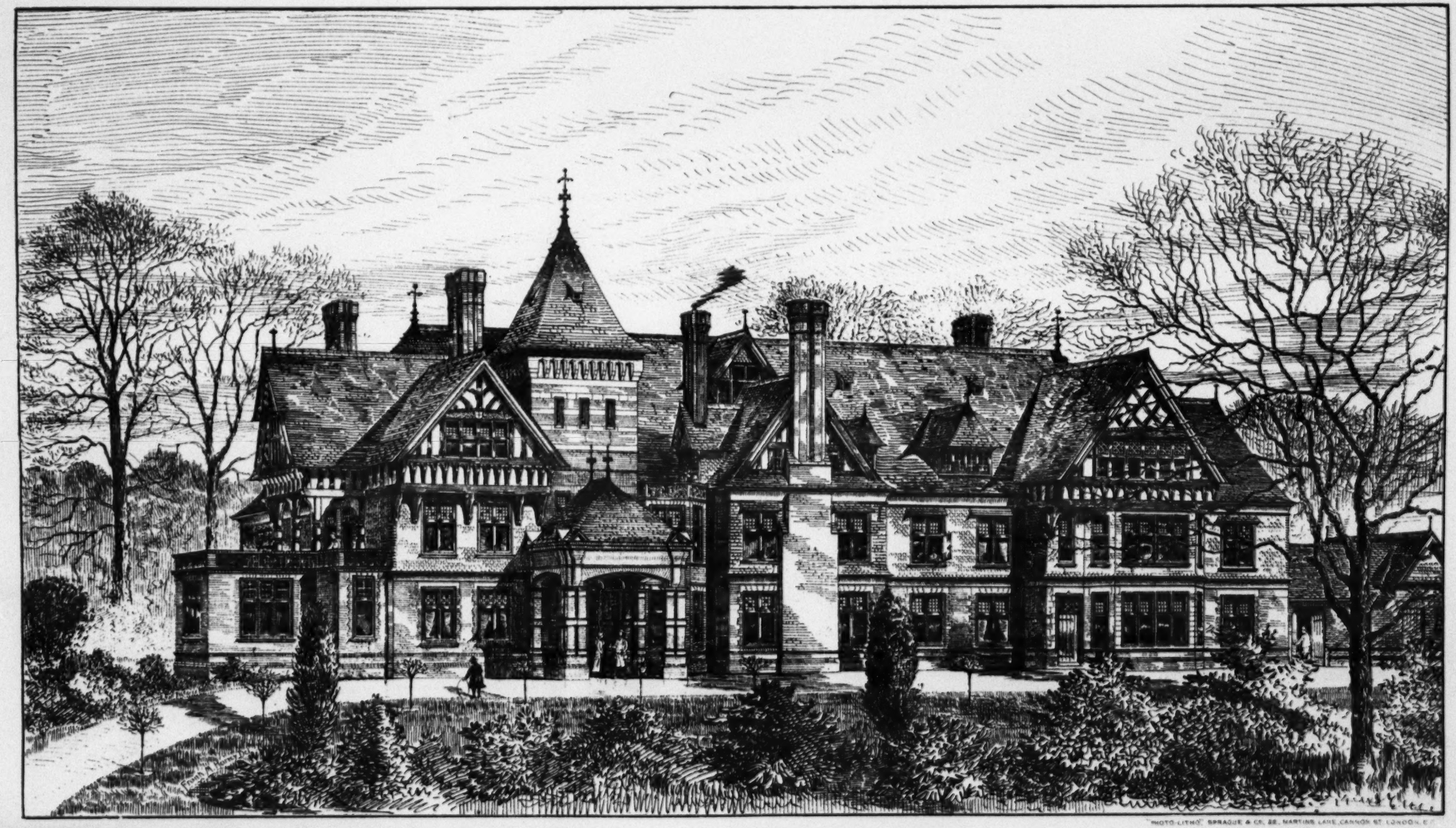


INK-PHOTO: SPRAGUE & CO. 22, MARTINS LANE, CANNON ST., LONDON, E.C.

SELECTED DESIGN FOR ALL SAINTS CHURCH, PETERBOROUGH: EXTERIOR VIEW.—Mr. Temple L. Moore, Architect.

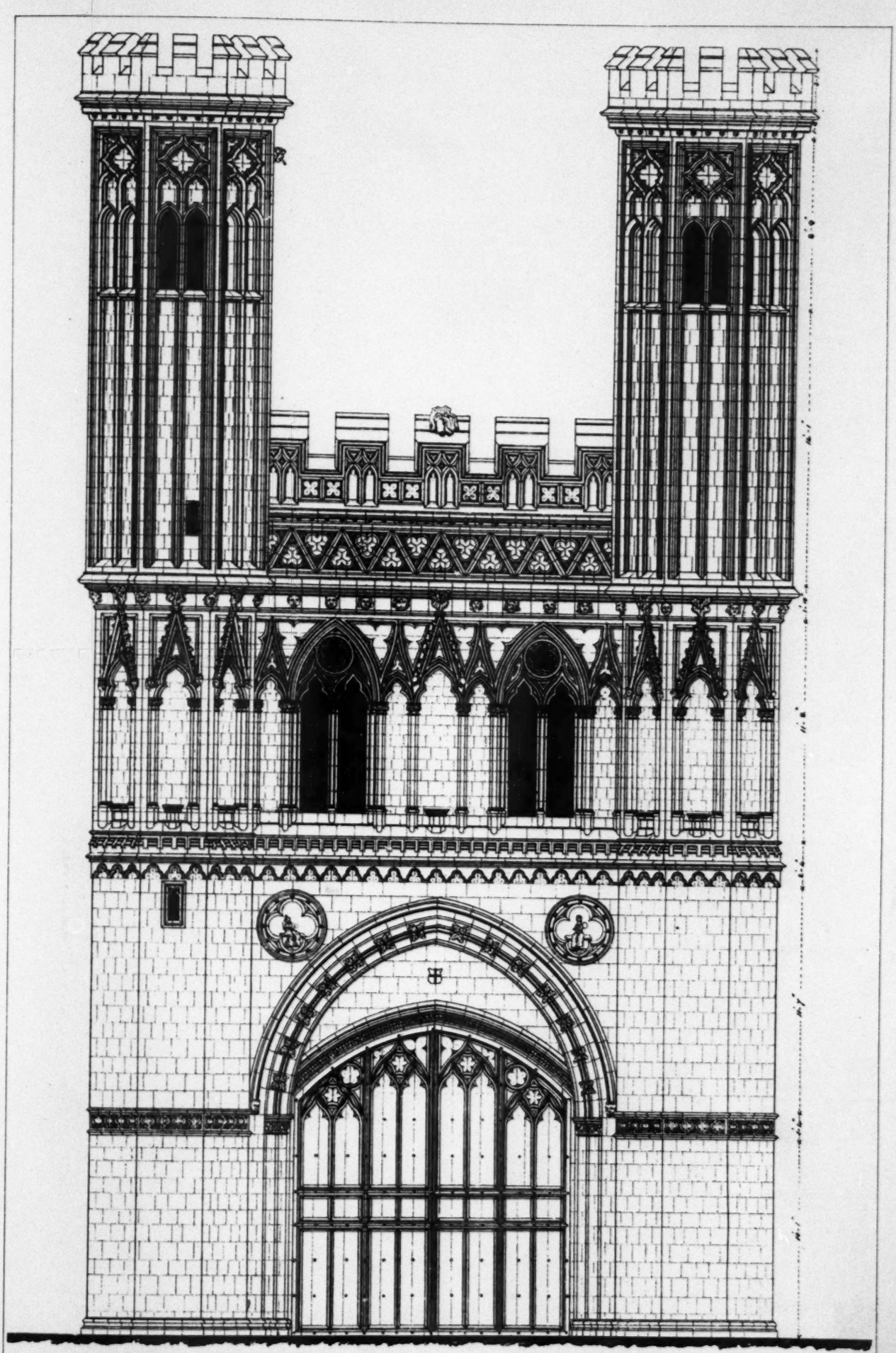
PHOTO-LITHO. SPRAGUE & Co., 22, MARTINS LANE, CANNON ST, LONDON, E.C.

Woodlands Park · Stoke D'Abernon · Surrey · Dining Room, *Mr Rowland Plumbe FRIBA Archt*



"PHOTO-LITHO" SPRAGUE & CO., 82, MARTINS LANE, CANNON ST. LONDON, E.C.

*Woodlands Park · Stoke D'Abernon · Surrey · View facing road * Mr. Rowland Plumbe FRIBA. Archt.



FRONT ELEVATION.

PHOTO-LITHO SPRAGUE & Co. 45, MARTINS LANE, CANNON ST. LONDON, E.C.

ST. AUGUSTINE'S MONASTERY, CANTERBURY: ENTRANCE GATEWAY.—DRAWN BY MR. H. J. WHITE.

Awarded the Architectural Union Company's Prize, 1886.

Illustrations.

SELECTED DESIGN FOR ALL SAINTS' CHURCH, PETERBOROUGH.

WE illustrate this week the external and internal views of the design for the above church, which were selected lately in competition, under the device of a "Red Star."

It is proposed to face the church externally with red brick, with window dressings and quoins of Ancaster stone, with cills and plinths of Ketton stone. Inside the brickwork is to be distempered, and the pillars and arches are to be of Bath stone.

The roofs are to be boarded and panelled under the rafters, the floors are to be laid with wood-block paving. The church is to be seated with chairs. The first part of the church to be commenced shortly is to consist of the first four bays from the east end and the lower 10 ft. of the tower, which forms the vestry, the remaining bays of the nave and the completion of the tower being left to a future time. The architect is Mr. Temple L. Moore, of London.

COMPETITIVE DESIGN FOR ALL SAINTS', PETERBOROUGH.

THE accompanying illustration of All Saints', Peterborough, was sent in for the same competition for which we give the selected design. This design was placed second. It was proposed to build it of Sutton-stone for the rubble work and Clipstone for the freestone, both of these being a local stone. The church is designed in a plain but substantial manner, as the funds were very limited. The estimated cost, including tower, &c., was 5,000*l*. The architect is Mr. J. Martin Brooks.

WOODLANDS PARK, STOKE D'ABERNON.

WE this week illustrate a design for a country house recently built for a gentleman who farms his own estate of several hundred acres, near Leatherhead, Surrey. The old house originally existing on the site was an ordinary stucco-fronted, slate-roofed building. It has not been removed, but where not surrounded by the new buildings, has been re-roofed and faced with red brickwork and tile hanging in such a manner as to bring it into harmony with the new structure. Suitable character has been given to the exterior by the large-span, steep, tiled roof which contains a floor of bedrooms, many of them where the half-timbered gables are introduced being of unusually large dimensions. The first-floor is principally covered on the outside with tiles hung on walls 14 in. thick. The verandahs shown in the garden view are approached respectively from the boudoir and one of the guest-chambers. The ground-floor walls are faced with red brick, the walls being 20 in. thick, and built hollow. In the interior the general arrangement of rooms on the ground-floor is shown in the small plan attached to the garden view. The house is approached from the road through a covered carriage porch. The large central hall is built in place of a number of offices and dark closets formerly in the centre of the old house; it is open through both floors and half way up the roof, and is covered with a semi-decagonal panelled ceiling, the three centre panels being filled with painted glass under an outer skylight which is arranged in the flat of the main roof.

The new part of the house and also the hall is mainly fitted up with oak in character with the view given of the interior of the dining-room, the walls of which, where not covered with the joiner's finishings, are hung with tapestry. The ceiling of this room is panelled in oak. The floors above contain about twenty-five bedrooms with dressing and bath rooms, &c., attached to many of them.

The large winter garden screens the domestic offices from the pleasure-grounds and park beyond.

The whole of the premises are lighted by incandescent electric lights; the installation having been carried out by Messrs. Laing, Wharton, & Down. The engine-house is built some distance away along with the farm buildings, and contains a 20-h.p. Babcock & Wilcox boiler, driving an Armington Sim's high-speed engine, which gives motive power to the shunt-wound dynamo-electric machine. This machine charges fifty-four large secondary batteries which are capable of illuminating 150 lamps, this number being sufficient for ordinary purposes. On special occasions, however, the engine is kept running to reinforce the accumulators, when nearly 300 lamps are used in the main building together with the farm buildings, stables, and the bailiff's and coachman's houses. A special feature connected with the electric lighting has been obtained by introducing lamps behind the twenty-four glazed panels of the hall ceiling, so that the light comes through the painted glass.

Mr. Messom, of Twickenham, was the contractor employed; the painted and ornamental leaded glass has been executed by Messrs. Gibbs & Howard. Messrs. George Jackson & Son's fibrous plaster has been used largely in decorating the hall, the colour decoration of which was carried out by Messrs. W. Phillips & Son. Messrs. Veitch were employed to lay out and plant the new portion of the grounds and to furnish the winter garden.

The works were carried out under the superintendence of the architect, Mr. Rowland Plumbe.

GATEWAY, ST. AUGUSTINE'S MONASTERY, CANTERBURY.

THE measured drawings of this gateway, which we publish in this number, were made by Mr. H. T. White in competition for the Architectural Association medal for measured drawings, which was awarded for these, as the best set submitted.

The gateway, a fine example of work of the Decorated period, is the principal remnant now existing of the Benedictine Monastery, the original foundation of which is said to have been due to St. Augustine in conjunction with King Ethelbert.

The drawings represent the gateway as it now stands; it underwent some little repair and restoration some years ago, but the greater portion of it is old work.

We very much regret to learn that Mr. White, the young architect who made these measured drawings, died on October the 18th, since the medal was awarded for them and the drawings sent to us for publication. He just lived to hear that his set of drawings had been awarded the medal. He was, we understand, an industrious and promising young architect. That he endeavoured to do his work thoroughly the accompanying drawings show, and we have to regret the loss of one who would probably have been a credit to the profession.

COMPETITIONS.

Johnstone Combination Hospital.—On the 8th inst., the special committee of the Board sat for nearly four hours examining some seventy sets of competitive plans which had been lodged in answer to an advertisement. The committee, the *Glasgow Herald* understands, reduced the number to a leet fifteen, from which it is intended to make a selection. There are fifty competitors, some of whom have sent in alternative plans.

Kingston Workmen's Club and Institute.—In the competition for the rebuilding of this club, which was destroyed by fire, the premiums for the designs were awarded to "Endeavour," by Mr. Windybank, Kingston, first; "Fire," by Mr. E. Carter, Surbiton, second; and Mr. Threadkell, Kingston, third; the maximum cost to be 1,900*l*. Mr. Blatchley, hon. architect to the Club Union, was the assessor.

Lewes Public Hall and Offices.—We hear that the result of the recent competition for designs for a Public Hall and Offices for Lewes, is that the first premium has been awarded to Mr. S. Denman, of Brighton; and the second premium to Mr. Mark J. Lansdell, of London and Hastings.

The Late Mr. Vulliamy.—We see by the paper of business for this week's meeting of the Metropolitan Board of Works that Mr. Lawrence has given notice of his intention to move "That it be referred to the Works and General Purposes Committee to consider and report as to the desirability of obtaining power to pay to the widow of the late Architect (who served the Board upwards of twenty-five years) one-half of the commutation value, according to the Government tables, of the pension that had been voted to him."

SCOTTISH ECCLESIASTICAL ARCHITECTURE.*

BY MR. HIPPOLYTE BLANC.

THERE is much fugitive literature floating about dealing with Scottish architecture. Burton, Robertson, Rickman, Fergusson, and others, have each touched it in their literary travels, and each seems in succession to have accepted the promptings of the earliest of these writers; and all have nearly succeeded by the harmony of their conclusions in popularising a belief that Scotland was a nation better known in the arts of war than in those of peace, and that, incapable of even harbouring art, she developed nothing, but was the imitator of the art of a foreign people, intercourse with whom imbued her with their sentiment and forms of art. The scantiness of the collections of material for written history seem to have hindered any just estimate of Scotland's individuality being formed; and, by most writers, the little that has been explored seems to have been accepted as sufficient upon which to found a conclusion. A systematic examination of existing remains is not stated to have been made by any of the writers named; nor can we trace that such is likely to have been done, because the examples selected by each writer, and the particular features viewed as analogous to foreign prototypes are nearly the same. This is unfortunate, because the high place earned by those authors as elucidators of architectural history claims for their writings almost unconditional acceptance. Be it observed, however, that they are not all technically-trained writers; and when it is pointed out, as I hope to succeed in doing, that it is not to history one must first look for facts, but to the buildings that are left to us, not only in their grouping and outlines, but chiefly in their details; then we may recognise the importonce of a technical training as an essential to a fair interpretation of art history.

Unquestionably the best exponents of Scotland's architecture are the works by Muir (1848),—a carefully-compiled, well-classified, and accurately-defined inventory of Scotland's art progress, as shown by her buildings. With commendable prudence, conclusions are rarely drawn, though, in the matter of the period of foreign influence on Scottish architecture, there is an inclination to the finding in which the succeeding writers have concurred.

As yet, little has been collected relative to the early and minor ecclesiastical buildings of Scotland, and, in consequence, topographical works on those are few. But we are glad to welcome one most important addition to the scanty number, and which, though not bearing upon the ecclesiastical section of Scotch architecture, will unfold much that pertains to it, and help to give coherency to any future effort made in writing Scotland's ecclesiastical art history. The work to which I refer is that upon the "Castellated and Domestic Architecture of Scotland," now issued by Messrs. M'Gibbon & Ross.

Entering the path of architectural history with the advent of Christian missionaries to our island, we find of the caves or crypts and cells which they formed in our midst, there is not much to note. The former were rude chambers cut out of the rocks, comprising sometimes two apartments, and used as places of religious retreat. The latter were structures which cannot be said to be more than mere forms of buildings without definite architectural character. All over Europe such places of worship seem to be similar. Curzon, in his "Monasteries in the Levant," describes the numerous caves and holes,—some natural, but most artificial,—in the rocks of the Holy Vale of Meteora, in Albania. He adds, "in these pigeon-holes whole flocks of hermits roosted."

In Scotland, as elsewhere, wood and wattles may have, in early times, supplied the necessities of certain colonies of cell-builders, until, in the sixth century, the "Roman" fashion of building in stone was adopted. The first structure was the church at "Whitherne" in Wigtownshire. With Columba's advent a new impulse was given to building churches, and these were of stone, as in Ireland (from whence Columba came). That found by Sir James Simpson on Inchcolm is perhaps the most perfect example of the period left us. It is about

* From the address of Mr. Hippolyte Blanc, President of the Edinburgh Architectural Association, delivered at the opening meeting of Session 1886-7 on Thursday, November 11th.

16 ft. by 5 ft., very rudely constructed, and is stated to be contemporaneous with some of the earliest Irish oratories.

In nearly all cases, Irish churches built of stone were also designed to have stone roofs, no wood being used in their construction. They were generally rectangular,—longer than broad,—and up to the period of the Norman conquest were not of the "basilica" form; that is, without apses. There are, in short, no evidences of Ireland obtaining her types from Rome. It may safely be asserted, says Fergusson, that the Christian religion did not reach Ireland through any of the ordinary channels across the Continent, but that she derived her early Christianity and religious forms from the East, by some of the more southerly centres which at that time seem to have touched on Ireland. As in Greece, the churches were small, not intended for the assembly of large congregations, but simply for the accommodation of the officiating priest. *Many* churches, not *large* churches, seem to have been the intention. No circular churches of the early period have been found in Ireland. The early works in Scotland bear strong marks of Irish influence, and these are chiefly in the western district. Between the period when Columba and his apostles spread the torch of religious influence over Scotland and that of the advent of the saintly Queen Margaret, many Christian edifices would have been founded; but of these nothing now remains, excepting, perhaps, the two towers of Abernethy and Brechin, which show their Irish origin on their face. The dates assigned to them are A.D. 715 and 1010 respectively, and their analogy to Irish types is traced by Dr. Petrie, in his work on the "Round Towers of Ireland."

I have noted that round churches are not found in Ireland, neither are there any of transeptal or octagon form, excepting cathedral or monastic buildings. The round forms, however, though few, are found in England. In Scotland, one only is known to exist, namely, St. Orphir, in Orkney. It is described by Sir Henry Dryden, who claims for it a direct influence from the Church of the Holy Sepulchre at Jerusalem. Sir Henry further states his opinion that the Crusaders, in the eleventh century, probably were the means of importing the form into Britain. Those in England are of somewhat earlier date, but all are in the same century. Sir Henry, in his conclusions, has the support of history, which bears that Earl Haco, who had a palace near this church, went to the Holy Land, and returned to die in 1103. Without, however, seeking to undervalue the belief in the independent importation of the Scottish example from the East, more recent publications have revealed to us many churches of round form in Scandinavia and neighbouring islands which express more of the primitive modes of construction, and are more elementary in form of plan than the supposed Eastern prototype. Moreover, those examples which are complete possess local peculiarities which seem to claim for them a local origin. The only thing common to all of them is that they all have circular naves, and have, projecting from the outer circumference, a small apse of semicircular or horse-shoe form. The Church of the Holy Sepulchre is, doubtless, roofed with stone, whereas the examples in Northern Europe have coved roofs in timber and thatching, even after stone roofing had been introduced into Scotland.

The feature which seems to give local origin to those in Scandinavia is that many of them have a double floor, the upper one being without windows, but pierced at regular intervals near the eaves with small openings, to be used for defence in time of trouble. Access to the upper floor is in some cases by a trap-door and movable stair, and sometimes by a stair in the thickness of the wall.

It, therefore, seems more probable that the prototypes of our Scottish examples are to be found in Scandinavia. An equally probable origin is that suggested by Fergusson, that the people, when first converted to Christianity, clung to the circular form as the sacred one which they had been accustomed to reverence in the tombs of their ancestors, and that the round churches are lineal descendants of those circles of stone,—half tomb, half temple,—which are known as spread over this country from Stonehenge to Stennis, and which are equally common throughout the Scandinavian province.

Small transeptal churches of early date in Scotland are few, the remains of only one existing in Shetland, and among those churches found in Orkney and Shetland none have aisles.

In England the Saxon character of architecture, not found in Scotland, gave place to the phase of architecture called Norman. This was grafted on Saxon forms through the influence of the advances of William the Conqueror; but even before his day Norman detail was not an exotic in England. The sympathy between the early Normans and the English is shown in the record telling us that King Canute subscribed to the first foundation of Chartres Cathedral in 1020. The intercourse, which was frequent, between nobles in England with France, could not fail, as it did, to leave its impress in the architectural forms of that country. The Saxons built, after the Roman fashion, in stone, and in their plans of churches took the "Basilica" form, with eastern and western apses. The Normans likewise had adopted that form.

Scotland was not slow to adopt the new forms and better architectural definition which Queen Margaret's advent had introduced. Thus we find, besides the unique oratory built by that queen in Edinburgh Castle, some time between 1067 and 1093, many fair examples of Early Norman work are spread over Scotland.

At Birnie, near Elgin, is a very early church of nave and chancel, of rectangular form, under one roof, but having a well-defined chancel arch and imposts of decidedly Norman detail. Both in manner of construction and in form of windows the evidences of early date are well defined. The window external reveals, where original, are giblet-checked about 1½ all round, the ingoing on the interior having the usual wide level, with no visible sign of original glass check, though glazing is now inserted. The same feature may be seen at Norham old church, of decidedly Norman date. It may be that, in the absence of glass, the openings (which are small) were fitted with movable frames, on which a transparent skin or parchment was stretched, as was sometimes used in the small churches of Orkney and Shetland.

With the Norman Conquest a train of good for arts and learning advanced northwards. Large tracts of land in the Lothians, now ceded to Scotland, were colonised by new lords and their followers, and quickly a new and more fervent expression of religious feeling spread over Scotland as in England. Religious communities from France were not slow to journey with the tide, and we find a great church-building period begins. Its period of activity lasted upwards of 200 years, during which time architecture in Scotland followed closely the lines of the sister kingdom of England. Lands, under new partitions, were freely given over to the clergy, who were thus enabled to devote themselves to the erection of edifices which, if not so liberal in scale of magnificence, were at least in equal proportion to the more favoured conditions in England. When Margaret became the wife of Scotland's king, she set herself to stir new enthusiasm in her clergy. Her influence was powerful and effective. Still leaning to English forms she sought to assimilate to them the Scottish church. Her chaplain was from Durham, an English primate was her spiritual father, and her foundation at Dunfermline was peopled from Canterbury. The disposition to Anglicise the Scottish people was still further pursued by her sons after her death, and the influence of all is seen in the early church architecture in Scotland. It was not a reformation, but an overlapping of the English church forms and discipline. The chief sees were foundations by David I., and the cathedral constituents were copied from English models,—Dunfermline from Canterbury, Coldingham from Durham. In these early times, the ecclesiastical system in Scotland was monastic, not parochial; and, on the decay of religion among the clergy, their lands passed to laymen styling themselves abbots. The religious services were discharged by a prior and a few monks. This order of things was gradually displaced by the parochial system. It takes its rise from the gifts of lands to the Anglo-Norman colonists, and wherever the grant of land was made, there its new possessor formed a hamlet, and built a church for those on the estates. Many parishes so formed retain still the name of the original titled possessor. The clergy of these churches were either priests from England or native kinsmen of the founders. Even among the higher ecclesiastics this practice obtained more prominence. Robertson says, "Of fifteen prelates who were elected to the primatial see of St. Andrews, during the twelfth and thirteenth centuries, and who signed themselves as of the Scottish Episcopate, not one appears to have been a Celtic Scot. Most were Saxons and Normans from England. That the expressions of architecture, on both sides of the Tweed, are so similar during the twelfth and thirteenth centuries, is thus easily explained. The best, largest, and most refined expressions of ecclesiastic art in Scotland are of these times. The art was fashioned on English models, largely by English hands, and under English influence. To trace here the progress of building in Scotland, with contemporary progress in England, would be too lengthened a task; suffice it to note that in chronological sequence, in plan and arrangement, in composition of parts, and treatment of details,—in all but as regards number, magnificence of scale and elaboration,—the Norman and First Pointed churches in both countries were alike. In Dunfermline (1075), we have an epitome of Durham, which supplied Queen Margaret's father confessor, previously a prior there, and in Salisbury we have the prototype of Dunblane. Durham Cathedral was founded about 1070, Malcolm Canmore and Father Turgot being present at the ceremony. The ties between Durham and Scotland were thus drawn still closer, and one may infer that what detail the contemporary chapel of Queen Margaret in Edinburgh Castle exhibits will have some correspondence with that at Durham. Coldingham (1098), Canterbury, Carlisle, and Lindisfarne on Holy Island (a foundation of 1098), were at this time rearing their heads, and assuming grand proportions. Of these Lindisfarne has preserved most of its original outline of arrangement. Originally comprising a nave, with north and south aisles, transepts with apsidal recess in each, and chief apse eastward of the choir, it is a typical example of the Norman work. The details of strings, arch moulds, capitals, and bases are precisely what may be found at Durham, Dunfermline, and other contemporaneous work in both England and Scotland. The nave columns are varied in plan outline, and richly decorated in their height, almost alike in all of them. From such examples we see that, up to this period at all events, Scotland had not expressed any creation peculiar to herself, but was supplied with the art being fostered in England. As in the Norman, so in the First Pointed, period examples are alike in both ends of the island. Colonies of monks of different orders were constantly being sent forth from France and England; and such was the activity that, apart from parochial churches (which continued to be erected from the twelfth to the sixteenth centuries), of monastic establishments in abbeys, cathedrals, and priories about eighty were erected during a period of about one hundred and fifty years.

Dunfermline was recast in 1124 by David I., who brought Benedictine monks from Canterbury to occupy it. The nave of Durham had by this time been completed, and became the model for Dunfermline, with its channelled and diapered pillars. Waltham Abbey, an early Norman work, is perhaps nearer the prototype for Dunfermline, for in length and breadth, in treatment of the decoration on nave piers, &c., there is great similitude.

The Tyronensians, a reformed branch of the Benedictines, was founded in France in 1109, and had only one house in Wales. They had six in Scotland, of which perhaps Kelso is most unique, both in plan and detail. Ponderous and compact, with scarcely any nave, it bears marks of a more direct importation from France. It was founded about twenty years after the formation of the Order.

The first trace we find of the pointed arch in Scotland is at Kelso, in the tower arches built in 1128–1152; and we should remember that in France the earliest example is 1144, and in England 1154, so that Scotland stands in an almost parallel position. At Jedburgh also, built about the same time, we find the pointed arch in the clearstory, though that part may be much later, and may be classed as of transitional character. The whole indicates French influence in detail. It was founded by Austin canons from Beauvais.

In Scotland the Norman phase of architecture continued late; St. Magnus Cathedral, Kirkwall, dates from 1137, and of it Sir Henry Dryden states that it shows the same peculiarities of style which are found in churches of an older date in Normandy. At the same

time, to support his opinion, Sir Henry finds a connexion between that part of France and those who founded the cathedral. The parochial system in Scotland was quite established in the twelfth century, and of parish churches we have Dalmeny, built about 1154, Leuchars 1190, and Duddingston probably somewhat earlier. The earliest of these is about the period when that style was ceasing to be practised in England.

Scotland's works of the twelfth and thirteenth centuries are unquestionably her best efforts. In them we find exhibited an equal knowledge of the prevailing style, and power in treating it, that is shown in England. A peculiarity distinguishing the Scottish churches is their extreme narrowness compared with their breadth. St. Magnus Cathedral, Dunblane, Dundrennan, Glasgow, and Arbroath are all very long, and in this they more nearly resemble the proportions of French than English examples. As examples of purity of style, graceful proportion, and scholarly simplicity, we have Glasgow (1242), sometimes called the "Scottish Salisbury." In treatment, however, it is markedly different from its assumed prototype. No transepts, no flying buttresses, finials, or other excrescences so prominent at Salisbury are seen in Glasgow Cathedral. There, all is simplicity, the interior effect, of solid and simple design, being more emphatic in this respect than the exterior.

Elgin Cathedral, probably the finest in Scotland, was begun in 1224. It was the delight of strangers and foreigners who came to see it. It surpassed Glasgow in richness, but still preserved purity in the extreme beauty and fineness of its detail. The east gable is specially beautiful in composition and detail. The large round window over the double tier of lancet windows shows a closer affinity to French gable treatment than to English. The western double doorway is a remarkably fine and dignified example. In Early Pointed work double doors are frequently met with in both English and French churches, though few are on so grand a scale. Another, though much plainer instance, occurs in Glasgow Cathedral. A feature peculiar to Elgin is the double aisles to the nave.

Dunblane Cathedral, founded about 1233, is a further example of perfect grace and simplicity of design. Uncontrolled by the severity of Gothic forms, its every part is the expression of freedom and truth, and succeeds in producing beauty of composition and proportion that in Scotland has not been excelled.

In Holyrood we have a west-end treatment savouring somewhat of French feeling, especially in the towers. The doorway is perhaps the most beautiful in Scotland, if not in Britain, and at one time may have been double, the tympanum being much later.

For some years longer Scotland was enabled, under peaceful influences and royal encouragement, to pursue the development of her civilisation and arts; and from the scattered fragments remaining at Dunfermline Lady-chapel, Dryburgh choir, Inchcolm chapter-house, Crossraguel, Kilwinning, Pluscardine, Kinloss, and elsewhere, there is sufficient to show Scotland's ability to treat her art skilfully in her own way. The death of Alexander III., in 1286, brought those restful and prosperous times to a sudden check. For upwards of a hundred years Scotland suffered under the fierce contentions of a disputed succession. There was no advancement in art, and the hitherto quiet march of learning and social refinement was obstructed.

The erection of churches was interrupted, and consequently we find nothing on a large or complete scale attempted. A people whose ancestors the Romans were powerless to conquer were most unlikely to yield to southern oppression, which now manifested itself. Scotland increased her security by a military alliance with France, and until the succession of James I., in 1406, the flow of art intercourse with England was all but stemmed. With the revival of quieter times, art blossomed forth anew, but not in the style of its former magnificence. The long interval had lost to it generations of good and able men. The new generations, in the effort to supply the demand made upon them by the revival of learning and piety, struggled on. The seeds of art had become mixed. England had passed through the Decorated phase, and was occupied (in 1377) with the later phase of Perpendicular, peculiarly England's own, while France, seeming to have lost sight of licence, gave the reins to uncontrolled fancy, and was industriously pursuing the Flamboyant phase, which may be considered peculiarly her own. Scotland then, in a state of uneducated manhood, was left to begin upon her own art traditions. This her works show she did, and in doing so she began her new art history from the period of its cessation, and may have incorporated here and there some of the minor features concurrently expressed in England or France, and with which renewed intercourse may have made her artists acquainted. But wholesale imitation of the forms of plan or detail of any of these countries is not found in Scottish work. Her art had become as decidedly her own as her independence; and, true to the national characteristics, the strength and vigour exhibited in all the examples is particularly noticeable. We miss the delicacy of refinement and purity of the thirteenth-century efforts, but the new forms have the merit of originality, which longer study would trim to more pleasing expression.

It is to the collegiate churches chiefly we must look for the examples of Scottish art of the period. Of about forty of those, nearly all were founded in the fifteenth century. The selection of a few of them will serve to show their characteristics. Generally, the churches are not of great dimensions, but many have very carefully executed detail. The plan is usually cruciform, as at St. Giles's, Linlithgow, St. Monance, Seton, Corstorphine, Ladykirk, &c., and comprises a central tower, south-west porch, sacristy, and sometimes chantry chapels. In many instances the nave has not been completed. Where towers are not central they occupy a position on the west gable of the nave, such as at Linlithgow, Stirling, Ladykirk, &c. The towers are terminated with a polygonal spire of stone, rising from within a parapet enclosure,—the only instance of a broach spire being that at Seton. The cathedral form of two spires at the west end of the nave is found only at Aberdeen, where the prevailing simplicity is changed for rather a poor effort at decoration.

But it is in the tracery of the windows we find most to arrest attention. There we find a leaning to the so-called Flamboyant, but not the Flamboyant of France, nor its less profuse representations in England. The tracery is rather more purely Geometric than of the free flowing lines of that style, and in this respect is peculiarly Scottish. The windows are of two and more lights, and show careful thought and study, though the effect cannot always be viewed as satisfactory. Good examples are found at Paisley, Haddington, Melrose, Linlithgow, Seton, and elsewhere. At no time do we find in England so large a group of forms, such as we should expect had that country been the source of inspiration, and it is scarcely complimentary to the contemporaneous art of France to credit it with the heaviness and inelegance of detail which obtained in Scotland. Rickman, in a brief notice of Melrose Abbey, concludes the later additions there to be the work of a Frenchman, because of the record on a panel which bears that one John Murvo, born in "Parisse," "had in keeping all masonwork of St. Andrews, Glasgow, Melrose, and Paisley, &c." Had he brought with him the forms of detail peculiar to our Scotch works, we should probably find the same features in the other buildings noted as being under his care, He had the keeping of mason-work, which significantly indicates the limit of his appointment, and does not appear to imply an appointment as architect. Nearly all the features peculiar to Melrose of John Murvo's time may be found in other earlier collegiate and parochial churches in Scotland. Among the foundations of the fifteenth century, we find here and there an infuslon of Perpendicular feeling, now fully developed in English work. Melrose expresses most, and Stirling east end bears a touch of it in the windows. The inference is that channels to English art were gradually being opened up, and conveyed the feeling to Scotland, where, however, it is found blended with local feeling, which gives the results a mixed expression.

The window mullions, in many examples,—such as Aberdeen, Seton, &c.,—have the centre one of three or more mullions, with a double order of mouldings carried up into the tracery, and abutting upon the outer reveals of the windows, giving a very clumsy, inelegant appearance to the window.

Circular or wheel windows are not uncommon, though they have not much appearance; and where the upper part of a large window is designed with a circle, it is filled in with three and four cusped loops radiating from the circumference. A similar treatment of small circles is found in early work in Hampshire. The east window of St. Duthus' Church, Tain, is a good example of pure tracery of the Decorated period, the upper circle in which has a nearly parallel example in Dorchester and St. Alban's, England; others occur also in France.

The most unique church of this period in our midst is that at Roslin, which stands forth as the most redundantly decorated building, for its size, that we possess. Simple, but incomplete in plan, its peculiar richness has given rise to much speculation, and in the absence,—to a casual observer,—of any building of a like quality in Scotland, writers have found a way out of the difficulty of accounting for its peculiar art character by declaring it to be an exotic. From some source, most writers have quoted that it was built by artificers from foreign parts, and to Mr. Fergusson we are indebted for tracing a prototype in Spain. A closer examination of the building must, however, dissipate that idea. That the plan is not necessarily from foreign parts is shown by its nearly exact similarity to the east end of Glasgow Cathedral, built two centuries before, and in which occurs the same geometric ratio of proportion. In its profusion of carving (similar details to which may be found in edifices of the period) may be traced the outlines of mouldings common to nearly all the churches of the fifteenth century in Scotland, whether it be in the clustered shafts, with their capitals and bases, or in its window rebates, buttresses, and pinnacles. An increase of richness is given to the window ingoings and buttresses by the introduction of niche canopies and bases, but, so far as the buttress decoration is concerned, that also is a characteristic of the period. The four-leaved, isolated ornament, common in English work of the thirteenth century, is found also in Scotch examples. A solution to the speculation may be found in the circumstance that Lord St. Clair was hereditary Master-Mason of Scotland, and, naturally desirous to mark his estimate of the honour of his office, he would strive, in founding a church or chapel, to outvie the contemporaneous structures of other noble founders. The production displays an entire disregard of cost, and it may be, in its accomplishment, artificers from foreign parts were engaged, but if so they must have been under local direction and superintendence. The fenestration is of the same school as that of Haddington and other buildings, notwithstanding the insertion here and there of the eccentric form of St. Andrew's cross, and throughout the edifice nothing is revealed which would associate the design with any work beyond Scotland.

The only quality that seems common to Roslin Chapel and the example of Burgos Cathedral in Spain, cited by Mr. Fergusson as Roslin's prototype, if one may judge from the illustration in his own work, is that they are both excessively rich.

The detail of this period is exceedingly varied, nearly every building giving evidence of independent thought in some special feature, but the field is too wide to be taken up this evening. One feature common in Scotland is the persistent retention of the round-headed doorways through all the progressive changes of style. In these, therefore, there is no evidence for fixing dates. Their moulded work will, however, invariably afford a clue to the period.

Of the Scottish architecture of the fifteenth century,—the outstanding period,—much could be written, and in thus sketching a few of its points I merely desire to clear the way for a more thorough treatise upon it on another occasion. It represents the period when Scotland is seen to have relied more upon herself, and her efforts have therefore more force and individuality than is shown in any other of her building periods. Up to the thirteenth century we have seen that Scotland had supplied to her art from Ireland, Scandinavia, France, and England, in the handling of which to her own uses many evidences of independent thought are seen; but, as if still fresh in the liberties of her earned independence, she in the fifteenth century prefers to move on uncontrolled by foreign promptings.

This sketch would be incomplete without a notice of the crown termination given to a few of the towers in Scotland. They are, perhaps, the most beautiful and perfect of all her efforts

of later date. If not of Scottish origin it can be said they are peculiar to Scotland, and, so far as can be learned, are earlier than the only example existing in England, namely, that at Newcastle. To my mind the crown termination of St. Giles is superior in respect of vigorous grace of composition and perfect fitness of detail, to any of the others existing. That at Aberdeen descends to clumsiness, while that at Newcastle is too attenuated, and has not the restfulness of pose essential to the success of its effect.

A SANITARY RETROSPECT.

This was the subject of the interesting address delivered by Captain Douglas Galton, C.B., F.R.S., as Chairman of the Council of the Society of Arts, at the opening meeting of the 133rd session of that Society, held on Wednesday evening last. He said at the outset that as we were entering upon the jubilee year of the Queen's reign, it had occurred to him that it would be interesting to take stock, as it were, of the progress which had been made by the nation in some one of the branches of usefulness to which the proceedings of the Society had contributed, and it seemed to him that the most fitting subject to select would be that of the progress which had been made in sanitation during Her Majesty's reign. After giving a graphically-written sketch of the defective sanitary condition of the people of this country at the beginning of the Queen's reign, he proceeded to pass in review the principal steps in advance which had been made, including the institution of our system of registration of births, deaths, and marriages, and the progress of sanitary legislation and administration, thanks to the labours of Mr. Edwin Chadwick, Dr. Farr, Sir Robert Rawlinson, and others. Turning from the community generally to the metropolis, he said,—

A new era in metropolitan sanitation was inaugurated in 1855. In that year the Metropolitan Board of Works was created. In this body was vested the main drainage of the metropolis, but the charge of the subsidiary parish sewers was left to the vestries, who were also charged with the care of the streets and roads, the Metropolitan Roads Commission being abolished, and all duties of lighting, control of removal of refuse, &c., were placed on the vestries. Thus the formation of this new Board was somewhat of a retrograde movement, because the concentration of functions, which had been commenced under the Metropolitan Roads Commission and Metropolitan Sewers Commission, instead of being strengthened in the new Board, was abandoned, and something approaching chaos was introduced. This Board has, however, by degrees had remitted to it the care of London improvements, and certain other general municipal functions, as well as power to levy general rates. The City retained its individuality, excepting as to the main sewers, and effected improvements and opened out thoroughfares in the part in its jurisdiction. The improvements in the other parts of London are mainly due to the action of the Metropolitan Board of Works. Great alterations have taken place in our thoroughfares; indeed, Regent-street is the only important thoroughfare which has not undergone an almost complete transformation during the Queen's reign. Smithfield Market for live cattle has been abolished. Many of those large tracts of London which were occupied by dwellings of the most wretched description are now traversed by wide thoroughfares, and covered by artisans' dwellings erected by private enterprise. But there is no diminution of the rate at which the vast aggregation of population in London still continues to progress, and, unfortunately, many of the wretched crowded dwellings still remain, where those born in close rooms, brought up in narrow streets, and early made familiar with vice, are deteriorated in *physique*, and grow poorer from inability to work. A recent writer in the *Fortnightly Review* says of our prospects:—"The poorer quarters will become poorer, the sights of squalor, misery, and hunger more painful, the cry of the poor more bitter." This is an evil we have to meet and overcome. Although in respect of the housing of the working classes so much remains to be done, we have results to show that much sanitary improvement has been achieved. We can congratulate ourselves that, in the place of the mud banks which occupied the foreshore of the river in the heart of London, embankments extending from Chelsea to Blackfriars, and from Vauxhall to Westminster, form the finest roadways in the world; and that the sewage is removed from the heart of London by means of vast works.* The reconstruction of the drains, the removal of the sewage from the midst of the population, the opening out of thoroughfares so as to admit ventilation into crowded districts, have all tended to improve the sanitary condition of London. Some interesting tables, prepared for me by the kindness of Mr. A. J. Mundy, of the Registrar-General's Office, show the remarkable sanitary results of these various efforts. The death-rate of London in the five years 1838–42 was 25·57 per 1,000. In the five years, 1880–84, it was 21·01 per 1,000; and the deaths from zymotic diseases, which in the decade 1841–50 had averaged annually 5·29 per 1,000, were reduced in the years 1880–84 to 3·4 per 1,000. If, however, we assume that there had been no change in sanitary conditions, and, therefore, that the death-rate had gone on increasing according to Dr. Farr's formula of increase due to density of population when the sanitary condition remained unchanged, the death-rate of 1880–84 would have averaged 26·62 per 1,000; that is, a saving of 5·61 per 1,000 has been effected by sanitary measures. If upon this basis we compare the saving in life which has resulted from sanitary improvements at different periods since 1838–42, we find that it amounted to an annual saving of 4,604 lives during 1860–70; of 13,929 lives annually during 1870–80; and of 21,847 lives annually between 1880–84. The main drainage works were commenced about 1860, and terminated in 1878, and the increase in the saving of life in these consecutive periods may to some extent be taken as a gauge of the effect of the gradual construction and completion of these works. No doubt this London death-rate is far too high, and is an evidence that insanitary conditions still prevail all round us; that the housing of the working classes is still far from satisfactory, and that we are too careless about infectious disease. The Metropolitan Board of Works has never had a clear field for municipal action; yet when we compare the present condition of London with what it was at the Queen's accession, the Metropolitan Board of Works, in spite of the disadvantages of its constitution, will have a grand record to show, in the Jubilee year of the Queen's reign, of metropolitan improvements and metropolitan sanitation.

As to the general results of the sanitary legislation on the well-being of the people, Captain Douglas Galton said:—

The main principle which guided public administration, both before and during the earlier years of the Queen's reign, may be said to have been that of non-interference, and of allowing free competition to prevail; although, no doubt, some efforts had been previously made to regulate the labour of females and children in Factory Acts. The practical application of the knowledge derived from the Registrar General's statistics led to further investigation in particular cases by such men as Dr. Simon, Dr. Buchanan, Sir Robert Rawlinson, and others, and gradually caused a reaction from what may be called the *laissez faire* system, to the spread of opinion in the direction of control over individual action in the interest of the community generally; and the result was the enactment of the successive laws for regulating the sanitary condition of the people, which I have enumerated. This large amount of legislation is practically little more than the interpretation required by the increase of population, and by the complicated exigencies of modern life, of the common law maxim, *Prohibetur ne quis faciet in suo quod nocere possit alieno; et sit utere tuo ut alienum non lædas:* that is to say, no man shall do anything by which his neighbour may be injuriously affected, and each person must so use his property and his rights as not to harm any one else. This common law doctrine had become practically obsolete, because there was no machinery in existence to enforce it; and the present generation inherited a legacy of misery amongst the poorer classes, owing to the absence of control over the increase in our towns, the absence of regulations in the building of houses, absence of water supply and drainage, and other matters which I have mentioned. . . . . The present social condition of the people affords an equally striking evidence of general improvement. Food and clothing are cheap, the construction of streets and new buildings in our towns are regulated, houses are improved, overcrowding and cellar dwellings are prohibited, the common lodging-houses are controlled. Petroleum affords a brilliant light to the poor in country districts which are beyond the reach of gas, and who were formerly dependent on rushlights. Water supply is rarely deficient; removal of refuse is enforced. But there remains much still to be done. Numbers of the people are still crowded in wretched dwellings, our rivers are polluted and subject to floods; our infectious diseases are not properly guarded against. The main feature of the legislation of the past half century is the recognition of the principle that when large numbers are congregated together in communities, the duty of preventing injury from this aggregation rests on the community, and if this principle is duly acted on, if in all aggregations of population free circulation of air is encouraged by preventing the crowding together of buildings; if refuse is immediately disposed of, so as to cause no injury to any one; if pure water be provided; if we isolate infectious diseases; and, above all, if we are fortunate enough to retain the blessing of cheap food and clothing, we shall not transmit to our posterity a similar legacy of misery to that which we inherited.

* Captain Galton is surely rather too much of an optimist here. A great deal of the sewage is brought back again into "the heart of London," in the worst possible way, in the waters of the tidal river into which it has been poured. Let us alter that, and then it will be time to congratulate ourselves.—Ed.

ARCHITECTURAL SOCIETIES.

Birmingham Architectural Association.—The first ordinary meeting of the current session was held at Queen's College on Tuesday evening, November 16th. The Vice-President (Mr. John Cotton) was in the chair. Resolutions were read from the Leeds Architectural Society and the Manchester Society of Architects approving of the proposed new Charter of the Royal Institute of British Architects. The secretary read the annual report, balance-sheet, and class reports for the past session. The following gentlemen were nominated for membership:—S. J. Holliday, B. V. Hirsh, J. Jephcott, H. Buckland, L. Stone, G. Bassett, J. K. Shaw, H. R. Lloyd. A paper was read by Mr. Victor Scruton (hon. sec.) entitled "Poetry and Price-lists." A lengthy discussion followed, in which Messrs. W. Henman, A. V. Ingall, J. Newton, and J. Cotton took part. A hearty vote of thanks was accorded to the author for his interesting paper, and, after a response from Mr. V. Scruton, the meeting terminated.

Dundee Institute of Architecture.—Mr. James Sellars, I.A., Glasgow, read a paper on "Everyday Architecture" before a meeting of the Dundee Institute of Architecture, Science, and Art, last week. Mr. Sellars called attention to the need for improvement in sanitary matters, and pointed out that as one of the things which should form part of everyday architecture, or the everyday work of the architect. He was of opinion that for the general good of the community the authorities should have power to test drainage systems periodically, and to compel proprietors to repair or renew them as might be necessary. Speaking of the extent to which the profession was poached upon, Mr. Sellars mentioned that more than one-half of the plans which went before the Glasgow Dean of Guild Court were signed by persons who had no claim to be called architects, and who did not so designate themselves in the "City Directory."

Glasgow Architectural Association.—On the 9th inst., a lecture on "Architectural Study" was given Mr. Wm. Leiper, F.R.I.B.A., Honorary President. Mr. M'Nab, President, occupied the chair. The sum of his advice was that of Michelangelo, to draw often and draw well; the disadvantage Scotch architects labour under in the lack of all academic instruction in architecture, either practical or as a fine art, can be best minimised by the careful study of the works of the past by pencil and measuring rule. Some beautiful sketches by Mr. Geo. Reid, R.S.A., Mr. Haig, and Mr. Wm. F. Salmon, architect, who also lent the collection, were shown as samples of what such studies should be. At the close, after some remarks by Mr. David Barclay, F.R.I.B.A., and Mr. T. Gildard, a hearty vote of thanks was accorded to Mr. Leiper.

Manchester Architectural Association.—The fortnightly meeting of this Association was held on Tuesday evening in the board-room of the Diocesan Chambers, Mr. F. W. Mee in the chair. A paper was read by Mr. W. Parslow, F.R.I.B.A., of the Liverpool Architectural Society, on the subject of the design and construction of lunatic asylums. A discussion followed, and a hearty vote of thanks was accorded to the lecturer. The question of the Royal Jubilee Exhibition, to be held in Manchester during the coming year, was brought before the meeting, and a resolution was unanimously approved of expressing the opinion of the meeting that the action of the executive committee in the matter of architectural illustration is not in any sense either respectful or satisfactory to the profession.

York Architectural Association.—On the 10th inst. the opening meeting of the fifth session of this association was held at the Church Institute, under the chairmanship of the President (Mr. W. Hepper). The hon. secretary presented the report, which stated that the Society now numbers fifty members. Mr. W. Hepper, the President, gave his annual address.

OBITUARY.

Major-General Boileau, R.E., F.R.S., died a few days ago. He was for some time Superintending Engineer in the Public Department of Works for the North-West Provinces at Simla, and of late years had taken an active part in local government affairs at Kensington.

Mr. G. T. Doo, R.A.—Mr. George Thomas Doo, R.A. (retired), F.R.S., the well-known engraver, died on the 13th inst., at Sutton, Surrey, in his eighty-seventh year. He was a member of many foreign academies, and in 1855 was elected an Associate of the Royal Academy, being advanced to the full rank of R.A. in the following year. In 1861 he was elected President of the Artists' Annuity Fund, and in 1863 he gave evidence before the Royal Academy Commission at Westminster. Mr. Doo joined the ranks of the retired Academicians some years ago.

Mr. E. Bassett Keeling.—The death is announced of Mr. E. Bassett Keeling, F.S.I., in his fiftieth year. He was articled to Mr. C. L. Dresser, of Leeds, and amongst his works may be mentioned the New Jerusalem Coffee House (rebuilt in 1879), Prince's Mansions, Victoria-street, Westminster (recently illustrated in the *Builder*), the Auction Mart Restaurant, Token-house-yard and Tokenhouse-buildings. In the earlier part of his professional career he was architect of several suburban churches, and of the whilome "Strand Musick Hall" (subsequently converted into the Gaiety Theatre), which was very much criticised at the time of its erection, and it certainly exhibited many eccentricities of design, some of which have been obliterated by subsequent changes. Nevertheless, it had the merit of originality and effectiveness, and was not only at the time something novel in its way, but had even some influence on the style of other buildings erected soon after it; and it is not every architect who could say that of any one of his works.

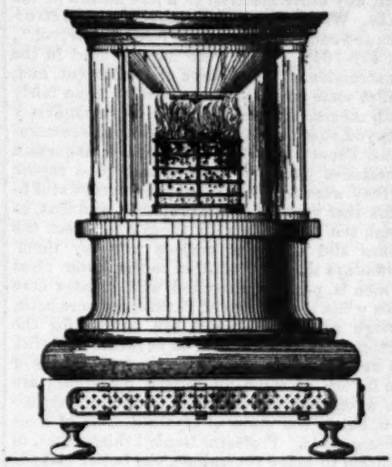
Mr. E. Ladell.—Mr. Edward Ladell, a painter whose *spécialité* was "still life," died on the 9th inst. at his residence in Exeter.

Mr. T. A. Prior.—Mr. Thomas Abel Prior, the line engraver, died on the 8th inst.

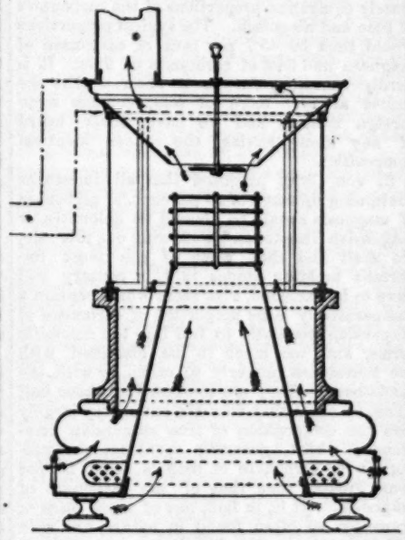
Funeral of the late Mr. G. Vulliamy.—The remains of the late Mr. Vulliamy were buried on Wednesday, the 17th inst., in the churchyard of the beautiful little church of Stone, near Dartford. There was a large attendance at the grave, and in addition to the relatives of the deceased, there were present a deputation from the Institution of Civil Engineers; a deputation from the District Surveyors' Association, consisting of Mr. H. Parsons, the hon. secretary, Mr. H. Hart, Mr. G. McDonell, Mr. T. H. Watson, and Mr. Robt. Walker; several officers of the Metropolitan Board of Works, including Mr. A. Gunn, the Accountant, and Mr. John Hebb, the Assistant Architect. The grave was dug on the south side of the chancel. The coffin, which was extremely plain, and had a brass plate simply recording the name of the deceased, and the day of his death, was heaped up with magnificent wreaths contributed by various friends.

A NEW STOVE.

This stove is designed and patented by M. Epaminondas Abate as a smoke-preventing and slow-burning stove, and appears to us worthy of attention both on the ground of scientific construction and agreeable appearance. As will be seen from the elevation and section, it is a circular stove with glass sides in



Elevation.



Section.

the upper portion, with a small central circular grate, which receives a double current of air, one in the centre delivering under the fire, the other outside furnishing a supply to the upper portion of the fire. The consumption when we saw it burning was slow and nearly smokeless; a considerable degree of heat is radiated from the glass and metal surfaces when the stove is entirely closed up, while the fire is still visible to view. The glass partition can be opened on hinges if desired, when the stove becomes practically an open fire; of course under those conditions its special arrangement for air supply is interfered with. The real value of the stove is in giving a moderate and equably-sustained warmth to an apartment or hall, with little smoke, and a very small consumption of coal, allowing for the cheerful effect of a visible fire.

Sanitary Institute of Great Britain.—At an examination, held November 11th and 12th, sixty-four candidates presented themselves,—nine as Local Surveyors and fifty-five as Inspectors of Nuisances. Questions were set to be answered in writing on the 11th, and the candidates were examined *viva voce* on the 12th. The Institute's Certificate of Competency to discharge the duties of Local Surveyor was awarded to Messrs. John Reid Anderson, John F. Curwen, John William Metcalf, and Charles Chambers Smith; and the Institute's Certificate of Competency to discharge the duties of Inspector of Nuisances was awarded to forty-two of the fifty-five applicants.

CORK CATHEDRAL.

Sir,—Admirers of Cork Cathedral, the noblest work of Mr. Burges and (some think) of the Gothic Revival, will be sorry to hear that a change is in contemplation there which will very seriously alter for the worse the aspect of the interior of the building, besides greatly impairing the effect of a fine musical instrument. The church, as those who have seen it are aware, is one of the few modern ones for the English service having the organ in a western gallery. For this the building was designed, the west end of the nave having a lofty portal (which forms with those of the aisles the finest west front of any modern church), and in the gable a rose window, on either side of which, in the gallery, the organ is arranged, forming an exceedingly satisfactory interior termination to the church. I have, however, just learned, on a visit to the Cathedral last week, that it has most unfortunately been determined to remove, at the first opportunity (when the money comes in) the organ to the choir, stacking the pedal pipes to lumber up the south transept, and getting in as best can be managed the rest of the instrument in a gallery to be constructed in the south choir aisle, where some brackets were left by Mr. Burges to carry a small choir organ. This plan, if carried out, will ruin the effect of the west end, which is quite unlighted, save by the rose window aloft, and will become a dark empty space of no meaning, will encumber the south transept in a small church where there is no space to spare, close the view round the south ambulatory, one of the most charming architectural views there is, and last, not least, diminish by half the effect of a very fine instrument, for which, in a moderate-sized church, the west gallery is by far the best position. Were the Cathedral a large building, the excuse that the choir and organ could not work together would be a serious one; but here the length of the nave is not enough to cause any inconvenience, and the only reason alleged is that some of the congregation who may be near the west end object to hear the louder pipes above their heads. I write this letter, therefore, to call the attention, not of the Society for the Perpetuation of Architectural Bathos, for Cork Cathedral is not ancient, and, if it were, is far too noble a building for them to appreciate, but of all admirers of a building, designed, as a whole and down to the smallest detail, by the greatest architectural genius of the nineteenth century, and of any musicians who may have any acquaintance with the circumstances, in the hope that it may be yet time to ask the Dean and Chapter, or Vestry, or whoever is responsible, to reconsider their decision, and to leave Mr. Burges's great work in the state in which he left it. Mr. Pullan especially may or may not be aware of this, but if he be ignorant his attention should certainly be called to it. H. C. S.

*** There is not the slightest doubt that the change of position, and the breaking up of the organ into sections, would be ruinous to its effect as an instrument. It is a piece of utter folly to treat a large organ so. There is, however, the difficulty, continually recurring, that an organ is wanted near the choir, and they, for ritual reasons, must be at the east end. The best thing would be to put a small organ near the choir, and connect both organs to one keyboard (also near the choir) by electric or other action. This would cost less than moving the large organ, and be infinitely more satisfactory, both architecturally and musically.—Ed.

THE DANGERS OF NEW BUILDINGS.

Sir,—In reference to the *résumé* of a lecture on this subject in your last [p. 720], allow me to say that the dangers pointed out by Dr. Hülmann have long been recognised by the Italian Government, who will not allow a new house to be inhabited until one year after completion, and not then until it has been inspected and certified by a surveyor.

It is surprising that in a country like England, whose climate is so moist, no law has been passed prohibiting the occupation of houses which are sometimes scarcely finished, thus exposing the occupants to contracting diseases that may continue during a whole life; and this especially applies to the poorer classes, who have no means of drying their houses before inhabiting them. People in a good position can afford to have them dried before entering, in the same manner as several of the new hotels in London have been during the last few years. If a law to that effect were in existence, it would go far to prevent the speculative builder running up cheap houses, and using green timber and bad mortar and plaster. John Ashton.

A QUERY.

Dear Sir,—Can any of your correspondents assist me to a roughly approximate idea of the quantity of lime mortar used annually, say, in England? M. S. E.

FIR.

Sir,—Will some of your readers kindly give their opinion and experience on the relative merits of best Swedish red fir and good middling Dantzic fir, when used for lintels, joists, roofing, and ordinary carpentry? Which is the best? Timber.

CHURCH-BUILDING NEWS.

Alston.—The spire of St. Augustine's Church has now been completed, from the designs of Mr. G. D. Oliver; the cost was about 1,000*l.* The height from the ground to the vane is 145 ft., and of the spire above the tower 65 ft. It is understood that the old bell, which since the church was rebuilt has occupied a temporary position in the unfinished tower, has now been removed to the belfry, where its tones are heard to much greater advantage. It is in contemplation shortly to have a peal of bells.

Battersea.—On Saturday was consecrated by the Bishop of Rochester, the Church of St. Stephen, Kersley-street, Battersea. The site is on the south side of Battersea Park. This completes, all but one, which is now in progress, the number of churches erected by the aid of the Bishop's "Ten Churches' Fund," which has granted 4,000*l.* towards the 5,400*l.* required for the cost of the entire work, including all expenses. The church has been built to accommodate 700 persons, including space for sixty chairs. The foundation stone was laid on May 15, by the Right Hon G. Cubitt. The church is built in red and buff bricks, with window tracery, caps, shafts, and bases of arcades in stone. The arches are of bricks moulded specially for this building. The ground-plan comprises a canted apsidal chancel with aisles, nave with aisles, and a western vestibule. The aisles are low and without windows, being lighted by the large windows of the clearstory. There is a small tower on the north side of the chancel to take a ring of six small bells. The upper stage is formed to take a clock with four dials, built in moulded brick with a pointed brick for each of the hours. The spire is covered with tiles. There are extensive vestries in a crypt beneath the chancel. The east window is filled with stained glass from drawings by the architect of the church, Mr. W. White, F.S.A. It represents the condemnation and martyrdom of St. Stephen, with the Crucifixion and Ascension above.

Dolwyddelan, near Festiniog. — The new parish church of Dolwyddelan, consecrated on the 10th of November, seats 228 worshippers, and consists of a nave with chancel, having an organ-chamber on the north side. As it stands on sloping ground, advantage has been taken to arrange the clergy and choir vestries under the easternmost part of the chancel, and a staircase has been built in a semi-octagonal manner on the south side. There is a north porch with an open-timbered roof. The walls are built hollow of the beautiful slaty stone, procured on the actual site, with Runcorn stone dressings. The nave roof is open-timbered, having trusses with curved braces, and, like the rest of the church, is covered with local slates. The chancel has a wagon-headed boarded ceiling divided into panels by moulded ribs. The west end is surmounted with a massive stone-gabled bell-turret, for one bell. The church is fitted with open benches of pitch-pine, the choir seats and other chancel fittings being of English oak, of a more ornamental character, as is also the upper part of the pulpit; the base of the latter is of Wrexham stone, and also the font. The building is paved with Godwin's tiles, of special design by the architect, the floor to the chancel over the vestries being carried on Portland cement concrete, and rolled iron joists to gain height. The altar-rail is of oak, carried on iron standards. The floors under the seating and to the organ-chamber and vestries are of solid wood blocks. The windows are glazed with cathedral glass of various tints, to designs arranged by the architect. The church is heated with warm air by Messrs. Rosser & Russell, of Charing Cross, and lighted by oil lamps supplied by the Defries Patent Safety Lamp Company. The character of the church is an adaptation of the thirteenth-century style. Mr. B. Edmund Ferrey, F.S.A., is the architect. The work has been carried out by several contracts, not by one builder. The old parish church on a lower site still remains, and will be preserved as a mortuary-chapel, and for occasional use.

Newcastle-on-Tyne.—The Building Committee for St. Jude's Church, Newcastle-on-Tyne, have agreed to purchase a plot of vacant ground, and also buy and pull down the three houses adjacent thereto, and situate at the corner of Clarence-crescent and Barker-street, Shieldfield, as the site for the church, and they have appointed Mr. Arthur B. Plummer to be the architect for the new church.

The Student's Column.

STONE QUARRIES.—XXI.

MAGNESIAN LIMESTONES.

THE rocks we are now about to treat of have probably been the cause of more controversy amongst those who deal with problems connected with building stones than any other material of a like nature in the trade. We have previously alluded to the structure and composition of them (see *Builder*, vol. l., pp. 491–764). They were largely used in the construction of the Houses of Parliament, and, whilst some have stood the test of time fairly well, others, as is well known, have completely decayed, so as to necessitate considerable restorations. From a knowledge of this fact, magnesian limestones have not been in such good repute as they were formerly; but we venture still to think that much of this is prejudice, and that, as usual, the fault lies with those who select the stones and with the masons who lay them. Nowadays the work allotted to the latter class of men is, perhaps, executed with greater care than when the Houses of Parliament were built, though whether as much can be said for the former class would appear to be rather doubtful. As we have again and again urged, the causes of the failure of some magnesian limestones are not altogether due to their chemical composition, but to the state of crystallisation of their minute parts. Professor Daniell thinks that, in addition to being crystalline, the better class of magnesian limestones should contain approximately equivalent proportions of the carbonates of lime and magnesia. The typical proportions would thus be 45·7 per cent. of carbonate of magnesia and 54·3 of carbonate of lime. It is hardly necessary for us to observe that the stones always, more or less, contain some foreign matter, and we have never heard of any stone having the above identical composition.

B. von Cotta proposed that all limestones containing upwards of 23 per cent. of carbonate of magnesia should be classed as dolomites or magnesian limestones.* Following out this rule, we shall find that some of the most important building stones in this country will have to be excluded, viz., those which contain a comparatively large proportion of carbonate of magnesia,—too little to fall into the dolomitic series, and too much to be classified with the limestones properly so called, or with the sandstones. They are composed of about half silica, an oxide that does not enter very largely into the composition of true magnesian limestones; whilst, generally speaking, the proportion of carbonate of lime is about 10 per cent. greater than that of the carbonate of magnesia. It is, in fact, one of those cases of transition so often found in nature, and with which the systematist finds it extremely difficult to deal. The rocks under discussion are neither sandstones, limestones, nor dolomites, and were they sufficiently numerous we should certainly form them into a separate group, but from the fact that they are not, we shall, for convenience, describe them under the magnesian limestones, and the student should, therefore, be on his guard in estimating the action of the atmosphere on these aberrant forms. Dolomites used in building may, then, be divided into two groups. These are (1) magnesian limestones proper, poor in silica; and (2) siliceous dolomites, rich in silica.

Some of the principal quarries in the former group are at Anston, Bolsover Moor, Cadeby, Huddlestone, Mansfield—Woodhouse, Roche Abbey, Smawse, and Steetley.

Anston Quarries.—These are near South Anston, in Yorkshire. The stone is of a light brown colour, and if carefully selected stands the London atmosphere very well, as may be seen in the front of the Museum of Practical Geology, Jermyn-street. It was largely used for the structure generally of the Houses of Parliament. The following are the analyses of the stone from two different quarries, made by Messrs. Ransome & Cooper:—

	North Anston.		Stone ends.
Carbonate of lime	54·89	...	55·37
Carbonate of magnesia	42·07	...	41·71
Protoxide of iron	0·49	...	0·73
Peroxide of iron	0·24	...	—
Protoxide of manganese	trace	...	1·68
Silica	0·56	...	0·92
Water	0·51	...	0·45

* "Rocks classified and arranged" (English ed.), p. 245.

Bolsover Moor Quarries.—These are near Chesterfield, in Derbyshire. The stone is of a light yellowish brown colour. The specific gravity of a dry mass is 2·316, the weight of a 2-in. cube in the ordinary state being 4,890·8 grains; weight when well dried, 4,881·4 grains, and when saturated with water, 5,042 grains.* After being tested with Glauber's salts for eight days, it was found that the Bolsover stone disintegrated to the extent of one grain and a half; though we may mention we do not see that there is any practical outcome of this knowledge, for reasons previously explained. The following are analyses of the stone, the first by Professor Daniell and the second by Messrs. Ransome & Cooper:—

	I.		II.
Carbonate of lime	51·1	...	52·07
Carbonate of magnesia	40·2	...	40·60
Protoxide of iron	—	...	0·89
Oxide of iron and alumina	1·8	...	—
Peroxide of iron	—	...	0·83
Protoxide of manganese	—	...	trace.
Silica	3·6	...	3·64
Water	3·3	...	0·48

The Bolsover Moor stone has been largely used locally. It was selected for the Houses of Parliament, but owing to insufficient supply was not made use of.

Cadeby Quarries, near Doncaster, in Yorkshire. The stone is of a cream colour, and rather friable, the central beds being said to be the best. One specimen from Cadeby, which was experimented upon, absorbed one-fourth of its bulk of water. It has been used at Messrs. Day & Martin's manufactory, High Holborn; Edgware; and other places in the vicinity of the workings.

Huddlestone Quarries.—These are near Sherburne, the stone being of a light cream colour. Hard veins occur in some parts of the stone. The following is the chemical analysis, according to Professor Daniell:—

Carbonate of lime	54·19
Carbonate of magnesia	41·37
Oxide of iron and alumina	0·30
Silica	2·53
Water	1·61

It has been used in Selby Cathedral, York Minster, Westminster Hall, and the Cross opposite Charing-cross Station (S.E.R.).

Mansfield Woodhouse Quarries.—These are two miles from Mansfield, in Nottinghamshire, and the stone is of a light brownish tint, known in the market as "yellow Mansfield." It is very similar to the Bolsover Moor stone in appearance, and is nearly identical with it in geological position. It, however, has a greater proportion of black specks than is usual with stones of this class. The following analyses are taken (1) from Smith's "Lithology"; and (2) from the Mem. Museum of Practical Geology, the latter being made by Messrs. Ransome & Cooper:—

	I.		II.
Carbonate of lime	51·65	...	52·80
Carbonate of magnesia	42·60	...	44·31
Silica	3·70	...	0·47
Iron and alumina		...	—
Protoxide of iron	—	...	0·63
Protoxide of manganese (carbonate)	—	...	1·84
Water, &c.	2·05	...	0·23

The stone is very good for ashlar, columns, mouldings, and carved work. It has been used for the lower part of the river front of the Houses of Parliament; the Martyrs' Memorial, Oxford, &c.

Roche Abbey Quarries. — These are near Bawtry, in Yorkshire, and the stone is of a light cream tint. It is said to weather a dark colour, and lines show along the bedding planes. It has been extensively used in many churches in Lincolnshire and Yorkshire, including those of Tukhill, Blyth, and Bawtry; Roche Abbey; the Deanery, York; Toxteth Hall, &c.

The stone from the *Smawse Quarries*, near Tadcaster, is of a light brown colour, and rather brittle. It has been used in Ripon Minster, and repairs to York and Beverley Minsters.

That from *Steetley Quarry*, near Worksop, is of two colours, white and yellow. It has been used in the Houses of Parliament; the Abbey Church, Scarborough; and in Nottinghamshire generally.

The following are chemical analyses of the Roche Abbey stone (1) by Prof. Daniell; and

* See "Guide to Mus. Prac. Geol.," 1877 (4th ed.), p. 40.

Steetley stone (2) by Messrs. Ransome & Cooper :—

	I.	II.
Carbonate of lime	57·50	53·95
Carbonate of magnesia	39·40	43·78
Sulphate of lime	—	trace
Protoxide of iron	—	0·64
Oxide of iron and alumina	0·70	—
Silica	0·80	0·44
Water	1·60	0·12

It will be seen that the Steetley stone very closely approaches the typical composition of a magnesian limestone.

The principal quarries falling under our second group of siliceous dolomites are found in the vicinity of Mansfield, where the Permian beds consist of an upper and lower bed of stone, with intermediate marls and sandstones. The lower limestone, which is the more important, varies in thickness from 70 ft. to 100 ft.

Mansfield stone is known to all of us. There are several kinds in the quarries, but those chiefly used are white and red, both forming good building materials, well adapted for fine ashlar work, columns, carvings, &c. The following is mostly obtained from Rivington's "Build. Const.," part iii., p. 38.

Of the white Mansfield stone, there are several beds, the top bed of all being of a coarser grain than the others. The second and third beds supply a very good fine-grained stone, fit for the finest ashlar work; whilst the lowest bed is much harder, and is well adapted for stairs, paving, landing, &c. It has been used in the Town-hall, Mansfield; Clumber Lodge, &c. The red Mansfield is generally more uniform in quality and appearance, whilst it is also considered to be more durable than the white. It is from 4 ft. to 5 ft. thick, and is procurable in blocks weighing as much as 10 tons. Columns are usually turned on a lathe at the quarries. It has been used in flagging part of Trafalgar-square; ashlars, columns and niches, Burlington House; St. Pancras Hotel and Station; Bilton House, &c.

The following are the published analyses :—

	White.	White.	Red.
Carbonate of lime	26·50	41·30	26·50
Carbonate of magnesia	17·98	7·30	16·10
Silica	51·40 }	50·00 {	49·40
Iron and alumina	1·32 }		3·20
Water and loss	2·80	1·40	4·80

The analyses of the white stones were evidently made from two widely-different kinds, if one may judge from the amounts of carbonates of lime and magnesia.

A very large proportion of *Ireland* is covered with limestone of the carboniferous formation, which produces some of the most beautiful marbles in the market. It is also used locally for building purposes, but, in comparison with the softer and more easily worked limestones of this country, it is by no means so economical, whilst the dark colour is also against its extensive use. When built to harmonise with the Portland stone, of which several edifices in Dublin are constructed, it looks fairly well. Many of the most ancient round towers in Ireland are made of limestone.

Limestone is a comparatively rare rock in *Scotland*, and, when found, it is generally too highly prized for making lime, or for the smelting of iron ores, to be used in ordinary buildings, whilst the abundance of good sandstone more than compensates for the deficiency in this respect. There are, however, a few limestone quarries in the vicinity of Edinburgh and Glasgow.

Four Times Mayor.—Mr. James Fowler, F.R.I.B.A., has been three times Mayor of Louth, Lincolnshire; and on the 9th was elected to this office for the fourth time, the opinion being expressed and applauded on the occasion, that "his fellow citizens are proud of the mark he has made in his profession, his name being known not only in the county of Lincoln, but also all over England, and are sure that, as jubilee Mayor, he will strive to excel himself and thus do honour to himself and the town."

Registration of Plumbers.—A meeting was held on Wednesday at the Guildhall, under the presidency of Mr. Aldrman Knill (Master of the Plumbers' Company), supported by Mr. George Shaw (late Master), Mr. F. Machin (Prime Warden), and Mr. W. H. Bishop (Renter Warden), at which certificates of registration were issued to upwards of 200 plumbers.

Books.

Archæological Cantiana, being Transactions of the Kent Archæological Society. London: Mitchell & Hughes. 1886.

THE archæological wealth of the county of Kent seems to be as inexhaustible as the enthusiasm of its explorers. Canon Scott Robertson (who not only edits the Transactions of the Society, but contributes to the present volume some of its most valuable memoirs) is one of the foremost in the band, and in the course of the year has brought to light a good deal that is worthy of notice. The rescue-work from what Bacon calls the deluge of time has not been indiscriminate, nor, on the other hand, has it been all of one character. The palæontologist, the ecclesiologist, the genealogist,—we wish these names were shorter,—as well as the architect and the antiquary, may each find much to interest him in his own particular study, and to enlarge his knowledge. Of course one of the great advantages of these local societies is that they direct attention to details and discoveries which might otherwise escape observation. In them are often to be found, not only missing links in a pedigree, but also solutions of architectural puzzles and numerous anticipations made by the ancients of modern art and ingenuity. One feels inclined sometimes to ask with the wise man, "Is there any thing whereof it may be said, See, this is new?" The volume before us opens, in due regard to chronological order, with a paper upon some Romano-British interments discovered at Bayford, near Sittingbourne. Among the relics found in the graves were two extremely elegant examples of ancient art,—a glass goblet with a long slender neck and double handle (unique in that respect) and the handle of a bronze vase, cast in high relief and containing the representation of a man, surrounded by animals, and apparently in the act of using the sacrificial knife.

These interesting discoveries are fresh evidence of the well-known fact that the neighbourhood of Sittingbourne was thickly populated during the Roman occupation of Britain. Richborough, on the eastern side of the county, was an older settlement, and the memorials of the past which have been there discovered are many and various,—the leaden seals of Constantine, with the imperial effigies and titles, being among them. Mr. Roach Smith has drawn the Society's attention to the circumstance that not a single lapidary inscription has yet been found, and suggests that deeper excavations on the site of *Rutupiæ* would assuredly reveal some sepulchral records of the thousands who, for more than three centuries, made it their home.

Mr. J. F. Wadmore, A.R.I.B.A., scarcely claims a Roman origin for the mound on which the Norman Castle of Tonbridge was subsequently erected, but it may have been occupied for defensive purposes by Roman and other invaders in succession. There is no doubt that a substantial stone fortress existed as early as 1086, and that two years later it was besieged, captured, and to some extent dismantled.

About the year 1230 extensive additions were made to the simple Norman structure, and it is of these that remains are now to be seen. As Mr. Wadmore (who gives some excellent plans and sections of the old buildings) justly remarks,—"Had the work been earlier, we should have seen the round-headed windows, with which one is familiar, either at Rochester or Colchester; had it been later, it would have partaken of the Edwardian character, in which it is entirely wanting."

The ecclesiastical buildings which are described in the Transactions are, as one might expect, especially numerous. The Society, in its annual excursion visited Sundridge Church, of which the most striking features are its Early English arcades and lofty roofs; Chevening, with its interesting series of Lennard monuments and Chantrey's beautiful effigy of Lady Frederica Stanhope; Eynsford, with its apse and Galilee porch; St. Mary's, Sandwich, which was terribly injured by the fall of its central tower in 1667, but has preserved some curious Norman and later features; Great Mongeham, which was carefully restored some thirty-five years ago by Mr. Butterfield; and Eastry, with its narrow, lofty nave resembling an inverted ship, and a curious carving upon one of its pillars by which the Sunday letter for any year may be discovered.

Special memoirs are given of some of the more important churches, and amongst these must be reckoned St. Botolph, Lullingstone,—which Canon Scott Robertson has described and Mr. Herbert Baker illustrated with equal felicity. Lullingstone Church dates back to the Norman era, but it underwent so complete a transformation in the reign of Edward III., that it would seem, at first sight, to belong to the Decorated Period. The original plan was unchanged, but later on, — in Tudor times,—a north chapel was attached to the chancel and a rood-screen of singular beauty was inserted. The date of this handsome addition to the church's features can be accurately determined. It bears the pomegranate badge of Katherine of Aragon, sometimes alone and sometimes united with the rose of England, and here and there upon it occur carved peach-stones with the letter "E" cut on them which are evidently a rebus of the donor's name, Peche or Peachey. Sir John Peche, whose magnificent monument is one of the most conspicuous ornaments of the church, died in 1521–2, and his widow (who was a daughter of Lord Scrope) erected this screen partly as a memorial of her deceased husband. Canon Robertson suggests that both the monument and the screen may have been designed by Torregiano, Michelangelo's fellow-student, to whose skill we owe "the daintiest monument in Europe,"—the tomb of Henry VII. in Westminster Abbey. The magnificent tomb of Sir John Peche, which occupies the whole space north of the Communion-table, is carved with the minutest elaboration, even to the veins upon the hands of the recumbent knight. The armorial shields are numerous and fanciful, and, together with the other details, will repay careful study. Lullingstone Church has been remarkably fortunate in having had in its successive patrons several intelligent and liberal lovers of art. Sir Percival Hart, who inherited, as representative of Sir John Peche's sister, "re-edified" not only the windows, but also the whole of the north chapel, in 1614, and another of the same family and name carried on the work of renovation in the reign of Queen Anne. Then, Sir Thomas Dyke, who married the heiress of the Hart family, carried out some improvements in the middle of the last century, and Sir William Hart-Dyke, the present representative, has cut down the old square oaken pews and floored them with solid blocks instead of boards. Lullingstone is a rare,—we hope not a unique, — example of a country village church which has for five centuries enjoyed the loving care of those who have inherited the lordship of the lands around it. Among other interesting memoirs in this volume we must mention a paper by Mr. R. C. Hussey upon the curious little church of Barfreston; another upon the ancient architecture of Erith Church, from the pen of Mr. F. C. J. Spurrell; and a third upon the early history of Ashford, by Mr. Robert Furley, F.S.A. In this are some notices of domestic architecture and a good drawing of the boldly-carved gable-head on the old Butchery at Ashford. Quarry House, near Rochester, a Jacobean (or perhaps Elizabethan) red-brick mansion, formed the subject of a notice in our columns just forty years ago, and is, we are told, doomed to early destruction. Churchwardens' accounts and a very exhaustive account of church plate (illustrated) add variety to the contents of the Society's volume, which is excellently printed and admirably edited.

The Law of Bills, Cheques, Notes, and I.O.U.'s. By T. W. Smith, Barrister-at-Law. London: Effingham Wilson. 1887.

WE observe that though the date of this book on the title-page is 1887, that of Mr. Smith's preface is 1884. We presume, therefore, that we have now before us simply one copy of another edition recently issued from the press. There is no doubt that every one should be acquainted with this book. People,—even business men,—are often very ignorant about the law of cheques and bills. How many business men, for instance, who keep cheques till they have got together a little bundle to pay into their bankers, are aware that by keeping them they run a risk, and that a cheque is payable immediately, and that any one who keeps it does so at his peril? Full information on this and similar points can be found in a handy form in this little book.

Food Grains of India. By A. C. Church, M.A., F.C.S., &c., with numerous woodcuts. Chapman & Hall. London: 1886.

A SCIENTIFIC treatise by a scientific man on a subject of much economical interest, though hardly coming strictly within our class of subject. The illustrations are very carefully executed on a large scale, and give a good idea of the growth and character of the vegetable products they represent.

The Agricultural and Tenant Right Valuer's Assistant. By T. BRIGHT. (London: Crosby Lockwood & Co. 1886.)

THIS work is primarily intended for the agricultural valuer, but there are portions of the book which will be useful to others. Such, for instance, are the tables for calculating the contents of unsquared timber and for the valuation of estates. The book is handy in size and well printed, and it cannot fail to be useful to many.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

14,433, Venetian Blinds. J. S. Orton.

This invention consists chiefly of an arrangement of weights or springs to equalise the balance of parts in raising and lowering, and to provide for the equal lifting of the slats of the blind when the same is raised, instead of the first slat being raised first, and then the others gathered close together as the actuating cords are pulled. The cords are put over a long roller or cylinder, with lateral or end play to accommodate the coiling and uncoiling of the lifting cords, and this cylinder takes the place of the pulley-board of the ordinary Venetian blind. Weighted links are affixed, so that when one length is caused to descend it gains in weight and power exactly what is lost by the other portion in ascending. By this counterpoise the blind is always balanced.

14,425, Syphon Drain Traps. J. Gordon.

The object is to provide cheaper and more effective syphon traps by improving the form and arrangement. The invention consists in disconnecting syphons having one or more branches, each branch opening varying in size or diameter as required, and suitably rounded at the socket points. The fall is preferably 1 in 10 in the drain, thus providing for the desired drop at the ingoing end. Thus a 2 ft. syphon affords a drop of over 2 in. at the inlet end.

14,695, Electrical Door Fastenings. C. L. Carson.

The object is to provide for the release of door fastenings or bolts by a weak current of electricity acting on a contact piece. When the current is interrupted, the bolt of the door is withdrawn, or falls out of position by its own weight, so that in theatres or such places, in the case of panics, exit may be made by merely pushing open the doors.

14,775, Shop Stall-boards. R. Legge.

The stall boards are made movable, so that they may be run backward or forward with the goods displayed upon them, either by pushing or by mechanical arrangements, such as a crank actuating a worm-wheel and rack.

14,809, Fastening Doors, &c. A. P. Alexander.

This is designed for strong rooms or coffers, and refers to obstruction bars instead of hinges, which bars are locked and secured by cipher or letter locks.

15,138, Fastening Coal-hole Plates. E. G. Banner.

A lining piece is made with a groove running around the inner upper edge thereof, and with the said grooved edge is connected a channel for leading off water. The cover plate is coned upon the inside. The fastening is effected by two balanced arms set to such a position that when the plate is fixed they will catch just below the lining piece and securely fasten the plate. When the arms are pulled from below, the counter-balance is raised, the unfastening is effected and the plate may be lifted out.

15,248, Joints of Stoneware Pipes. O. Elphick.

With the object of making a joint which shall be tight even when the pipes are deflected out of a traight course; the lining is formed with inclined surfaces to facilitate the entrance of the tip of the next pipe to its place within the socket and the joint to the lining to the socket is made cylindrical, and with the tip on the extremity of the pipe of spherical curvature. Joints so made are not rigid, and yet remain tight when the pipes are not closely butted together.

15,269, Fittings of Doors and Gates. G. H. Gooch.

This invention is designed chiefly to prevent the wear and tear of the parts connected with the handles or knobs, and consists of a series of arrangements for fixing the rose and spindle by special means, with tools also designed for the especial purpose.

NEW APPLICATIONS FOR PATENTS.

Nov. 5.—14,245, W. Stuttle, Hot-water Boiler heating Buildings, &c.—14,284, E. Verity and Others, Lever Latch for Doors, &c.

Nov. 6.—14,305, H. Wilkes, Window or Sash Fasteners. — 14,310, J. Morley, Water-closets, Lavatories, &c.—14,322, J. Smeaton, Water-closets.

Nov. 8.—14,375, D. Burns, Chimney Cowls and Ventilators.—14,384, S. Robson, Ventilation of Dwelling-rooms.—14,386, T. Rees, Metal Tiles.—14,396, W. Blakeney, Earth-closet and Urinal.—14,409, S. Taussig, Electric Fire and Burglar Alarm.

Nov. 9.—14,423, H. Tucker, Corrugated Iron Roofing.—14,434, G. Howard, Decorating Wood.—14,470, H. & A. Foster, Sawing Machinery.—14,491, R. Henry, Sash-line Fasteners.

Nov. 10.—14,527, T. Cox, Fixing Bricks, Tiles, Cornices, &c., without mortar and cement.—14,538, W. Sargent, Circular Glass Ventilators.—14,545, J. Bridger, Glass Tile, Panel, &c.

Nov. 11.—14,580, H. Perry, Sizing or Varnishing Paper-hangings.—14,584, E. Keut, Heating and Ventilating houses.—14,627, H. Dodd, Flushing Apparatus.

PROVISIONAL SPECIFICATIONS ACCEPTED.

12,167, J. Tucker, Mortise Bolt.—12,824, J. Pollock, Window Fastenings.—13,130, P. Westmacott, Cranes and Hoists.—13,148, T. Armstrong, House Drainage.—13,284, F. Lyte, Manufacture of Pigments.—13,313, R. Reeves, Ventilation of Drains, &c.—13,355, R. Garland, Domestic Fire Grates.—13,365, H. Thompson, Kitchen Ranges.—13,468, G. Wickham, Siphon Cisterns for Flushing Water-closets.—11,502, G. and S. Jennings, Water-closets. 12,633, R. Pees, Mortise Lock.—13,278, C. Straub, Building Material for Architectural Purposes.—13,436, J. Harrington, Spirit Levels.—13,452, J. Hont, Fitting, Ornamenting, and Decorating Shops, &c.—13,554, S. Johnson, Automatic Water-closet Apparatus.—13,616, R. Scholefield, Brickmaking Machinery.—13,688, N. Locke, Opening and Closing Fanlights, &c.—13,693, J. Gozney, Cleaning the Pans and Seats of Closets.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to Opposition for Two Months.

13,622, F. French, Fastener for Window Sashes.—15,877, J. Dejaiffe, Dressing, Polishing, and Squaring Stone, &c.—228, G. Hardingham, Lattice Bridges.—307, A. White, Lavatories.—407, G. Jennings and Others, Flushing Cisterns.—538, R. Somers, Fireplaces.—3,309, G. Potter, Attaching Door Knobs and Handles to Spindles.—8,418, W. Wodson and R. Skeoch, Manufacturing Bricks, Ridge Tiles, &c.—10,464, C. Thornett, Fastening Window Sashes, either Shut or Partly Open.—11,078, A. Barber, Laying Asphalte Concrete Pavements.—15,097, C. McCarthy, Window Fastener.—487, E. McClellan, Traps and Air Valves for Waste Pipes and Drains.—4,856, W. Burdock, Lamps or Burners for Painters, Plumbers, &c.—5,286, E. Staples, Attaching Door Knobs to Spindles.—13,021, H. Dale, Fireproof Shutters for Stairways.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

NOVEMBER 8.

By WOOD & SPINKS.

Uxbridge-road—37, Adelaide-road, 77 years, ground-rent, 7*l.* 7s.	£105
Stratford—47 and 49, Lett-road, 71 years, ground-rent, 8*l.*	365
Hornsey—9 and 11, Brook-road, freehold	210

NOVEMBER 10.

By HARDS & JENKINSON.

Antigua—The Claremont Sugar Estate of 500 acres, and a leasehold interest in the Tremontaine Estate	1,500

By GIBLIN & CHILD.

Plumstead—157, Burrage-road, 33 years, ground-rent 2*l.*	230

By CHINNOCK, GALSWORTHY, & Co.

Kensal New Town—Ground-rent of 21*l.*, reversion in 7 ¼ years	465
Ground-rents of 67*l.* 8s., reversion in 87½ years	1,350
Ground-rents of 110*l.*, reversion in 81½ years	2,405
Ground-rents of 50*l.*, reversion in 5½ years	1,170
Bayswater—Ground-rents of 420*l.* 7s., reversion in 56½ years	15,000
Ground-rents of 160*l.*, reversion in 63½ years	4,625
8, Pembridge-place, reversion in 56½ years to rack rent of 140*l.* a year	165
7 and 9, Norfolk-terrace, reversion in 56½ years to rack rent of 170*l.* a year	155
Norfolk-yard, reversion in 56½ years to rack rent of 150*l.* a year	120

NOVEMBER 11.

By G. STOCKINGS.

Ealing-green—16, 18, and 20, Disraeli-road, 98 years, ground-rent 23*l.* 10s.	900

By VENTON, BULL, & COOPER.

Great Marylebone-street—No. 33, term 13 years, ground-rent 35*l.*	405

By C. C. & T. MOORE.

Ilford—1 to 4, Tyne-terrace, 77 years, ground-rent 14*l.*	300
Ground-rent of 14*l.*, reversion in 77 years	310
St. George's-in-East—13, Cannon-street-road, freehold	375
15, Cannon-street-road, freehold	270
Poplar—19 and 21, Northumberland-street, 78 years, ground-rent 2*l.* 10s.	370

By E. STIMSON.

Brockley—128 to 134 even, Brockley-road, 73 years, ground-rent 14*l.*	1,050
Walworth—42 to 60 even, Phelp-street, 21 years, ground-rent 16*l.* 16s.	745
51 to 57 odd, Elizabeth-street, 13 years, ground-rent, 10*l.*	£270
2, Elizabeth-street, and 47 to 53 odd, Westmoreland-road, 32 years, ground-rent 31*l.*	830
38 to 53 even, Liverpool-street, 22 years, ground-rent 28*l.* 16s.	1,070
Old Kent-road—82, 86 to 106 even, Mina-road, 34 years, ground-rent 42*l.*	2,440
1 to 9 and 17 to 21 odd, Smyrk's-road, 81 years, ground-rent 27*l.* 10s.	1,780
27 to 37 odd, Smyrk's-road, 33 years, ground-rent 21*l.*	1,250
39 to 45 and 65 to 71 odd, Smyrk's-road, 34 years, ground-rent 28*l.*	1,650
79 to 105 odd, Smyrk's-road, 34 years, ground-rent 49*l.*	2,940
26 to 54 even, and 60 and 62, Smyrk's-road, 33 years, ground-rent 50*l.* 10s.	3,180
64 to 88, and 94 to 102 even, Smyrk's-road, 34 years, ground-rent 62*l.* 6s.	3,395
Ground-rent of 36*l.* 10s., term 34 years	550

NOVEMBER 12.

By DENT & DALLAS.

Mitcham-common—A plot of freehold land, 2r. 16p.	510

By DRIVER & PERFECT.

Finsbury Park—6, Portland-road, 80 years, ground-rent 12*l.* 10s.	680
19, Woodstock-road, 81 years, ground-rent 6*l.* 10s.	305

MEETINGS.

MONDAY, NOVEMBER 22.

Royal Academy.—Professor A. H. Church on "The Chemistry of Fresco and Tempera Painting." 8 p.m.

Surveyors' Institution.—Mr. J. W. Willis-Bund on "The Extraordinary Tithe and its Redemption." 8 p.m.

Inventors' Institute.—Mr. Charles Ingrey, C.E., on "The Ailsa Craig Fog Signalling Station (27, Chancery-lane, 8 p.m.).

TUESDAY, NOVEMBER 23.

Institution of Civil Engineers.—Discussion on papers on "Concrete as applied in the Construction of Harbours." 8 p.m.

Liverpool Architectural Society.—Mr. J. H. MacGovern on "Antiquities of Kirk Braddan Cemetery and Peel Castle." 7 p.m.

WEDNESDAY, NOVEMBER 24.

Society of Arts.—8 p.m.

Royal Academy.—Professor A. H. Church on "The Chemistry of Water-Colour Painting." 8 p.m.

THURSDAY, NOVEMBER 25.

St. Paul's Ecclesiological Society.—Mr. J. Grimshire on "Some of the Cathedrals and Abbeys of England Architecturally and Historically Considered." 7·30 p.m.

Society of Telegraph Engineers and Electricians.—(1) Adjourned discussion on Mr. Gisbert Kapp's paper on "The Predetermination of the Characteristics of Dynamos." (2) Mr. James Swinburne on "Some Experiments on Secondary Cells." 8 p.m.

FRIDAY, NOVEMBER 26.

Royal Academy.—Professor A. H. Church on "The Chemistry of Oil Painting and of Spirit Fresco." 8 p.m.

Miscellanea.

The Superintending Architectship, M.B.W.—At the meeting of the Metropolitan Board of Works, held on the 12th inst., the Chairman (Sir James M. McGarel Hogg) stated that it was with much regret he had to inform the Board of the decease of Mr. Vulliamy, the tidings of which had been communicated to him by a telegram that morning. It was moved by Mr. Edwards, seconded by Mr. Freeman, and resolved unanimously, "That the Clerk do communicate to the widow of the late Mr. Vulliamy an expression of the Board's sincere condolence with her in her bereavement." Subsequently, at an adjourned meeting, it was moved by Mr. Edwards, seconded by Mr. Shepherd, and resolved—"That, pursuant to the powers conferred by the Metropolitan Building Act, 1855, and of every other power enabling the Board in that behalf, Mr. John Hebb, Assistant Architect to the Board, be and he is hereby appointed the Superintending Architect of Metropolitan Buildings, and Superintending Architect to the Metropolitan Board of Works, for four weeks from the 13th day of November, 1886, and that the seal of the Board be affixed to the above resolution." The Solicitor subsequently laid before the Board a copy of the resolution, and the seal was affixed thereto.

Water-Softening.—On another page will be found the prospectus of the Consumers' Economic Water-Softening and Purifying Company, which is being formed (as a branch or sub-company in connexion with the Atkins Filter and Engineering Company) to promote the more extensive use of Atkins's excellent process of water-softening, which has often been described and referred to with commendation in our columns. The project is one well deserving of the attention of sanitarians and water-consumers generally.

Official Salaries.—At the meeting of the Lambeth Vestry, last week, the salary of the Surveyor (Mr. M'Intosh) was increased from 600*l.* to 750*l.* per annum.——The City Commissioners of Sewers, at their last meeting, increased the salary of Mr. D. J. Ross, Chief Assistant to the Engineer, from 400*l.* to 500*l.* per annum.

Sale of Building Sites near Aldershot.—On Monday evening Mr. H. J. Brake, of New Bridge-street, offered for sale, at the Bridge House Hotel, Ash Vale, Surrey, a number of freehold plots of building land, situated in Ash Vale, near Farnborough and Aldershot. The land in question was recently purchased from the War Department of the Government by the present vendor, and has since been laid out for building purposes. It is close to the Ash Junction on the South-Eastern Railway, and to the Ash Vale Station on the South-Western line, and was described as very suitable for the erection of villas. The auctioneer observed that the property offered comprised some of the finest sites in the county, most of the plots being in an elevated position, commanding extensive views of the surrounding neighbourhood, including the camp and town of Aldershot. The locality presented specially attractive features for the erection of residential property, and to the speculating builder, the great demand for houses offered a tempting opportunity. There was a very numerous attendance, the sale-room being much crowded, whilst large numbers were unable to obtain admission. The number of plots announced in the particulars was 152, most of them having frontages of 20 ft. and a depth of 100 ft., whilst there were also several larger plots, having frontages varying from 40 ft. to 100 ft., and one exceptionally large plot, upwards of two acres in extent, which it was stated contained a bed of the best gravel, which would pay a large profit on the working, and an unlimited quantity of sharp sand of a bright colour suitable for every description of building. On the sale commencing there was a very active demand, and seventy-two of the lots submitted having all been sold at prices ranging from 1*l.* to 1*l.* 10s. per foot frontage, the auctioneer said that in consequence of the lateness of the evening the remaining plots would be offered on Monday next.

A New Public Hall at Harwich.—The rapid increase of Dovercourt (which is, in fact, a suburb of Harwich) as a seaside resort, has just led to the erection of a spacious public hall for the accommodation of the inhabitants of the two places. The building, which has been erected by the Harwich and Dovercourt Public Hall Company, is situated on the main high road, midway between the ancient seaport of Harwich and its younger watering-place, within about half a mile of the centre of each locality, and immediately opposite the redoubt, which occupies high ground overlooking the sea. The building has a frontage of upwards of 45 ft., and is 90 ft. in depth, thus covering a ground area of more than 4,000 superficial feet. It is faced with cut and moulded red bricks, relieved by stone dressings and windows. In the centre of the frontage there is a large arched window, flanked on each side with ornamental pediments. The north and south side frontages have each ranges of arched windows, and the whole of the windows are filled in with stained and coloured glass. At the west end there is a stage, with committee and retiring rooms on each side. The foundation-stone of the building was laid in May last by Mr. J. Round, M.P., and the structure has just been completed. Messrs. Whitmore & Reeves, of London and Chelmsford, are the architects; and Mr. A. Diss, of Colchester, is the contractor.

Liverpool Engineering Society.—The usual fortnightly meeting of this Society was held at the Royal Institution, Colquitt-street, on Wednesday evening; Mr. Coard S. Pain, Assoc. Inst. C.E., President, in the chair. A paper by Mr. A. C. Hurtzig, M. Inst. C.E., on "A Formula and Diagram for Ascertaining the Resisting Power of Piles," was read by the author.

The Severn Tunnel is to be opened on the 1st of December.

PRICES CURRENT OF MATERIALS.

TIMBER.	£.	s.	d.	£.	s.	d.
Greenheart, B.G. ....ton	6	10	0	7	0	0
Teak, E.I. ....load	9	0	0	14	0	0
Sequoia, U.S. ....foot cube	0	2	4	0	2	7
Ash, Canada ....load	3	0	0	4	10	0
Birch ,, ...load	2	5	0	3	10	0
Elm ,, ...load	3	10	0	4	10	0
Fir, Dantsic, &c. ....load	1	10	0	4	0	0
Oak ,, ...load	2	10	0	4	10	0
Canada ....load	3	0	0	6	0	0
Pine, Canada red ....load	2	0	0	3	10	0
,, yellow ....load	3	5	0	4	0	0
Lath, Dantsic ....fathom	3	0	0	5	0	0
St. Petersburg ....load	4	0	0	5	10	0
Wainscot, Riga ....log	2	15	0	4	0	0
,, Odessa, crown	3	5	0	3	7	6

TIMBER (*continued*).	£.	s.	d.	£.	s.	d.
Deals, Finland, 2nd and 1st...std.100	7	0	0	8	0	0
,, 4th and 3rd	6	0	0	6	10	0
Riga	5	10	0	7	0	0
St. Petersburg, 1st yellow	8	10	0	14	0	0
,, 2nd ,, ...	7	0	0	8	0	0
,, white	7	0	0	10	0	0
Swedish	6	0	0	15	0	0
White Sea	7	0	0	17	10	0
Canada, Pine, 1st	17	0	0	29	0	0
,, ,, 2nd	11	0	0	17	0	0
,, ,, 3rd, &c.	6	0	0	8	0	0
,, Spruce, 1st	8	0	0	11	0	0
,, ,, 3rd and 2nd	5	0	0	7	10	0
New Brunswick, &c.	5	0	0	7	0	0
Battens, all kinds	4	0	0	12	0	0
Flooring Boards, sq. 1 in., Prepared, first	0	9	0	0	13	0
Second	0	7	6	0	8	6
Other qualities	0	5	0	0	7	0
Cedar, Cuba ....foot	0	0	3	0	0	3½
Honduras, &c.	0	0	2½	0	0	3½
Australian	0	0	2	0	0	3
Mahogany, Cuba	0	0	4	0	0	7
St. Domingo, cargo average	0	0	4	0	0	7
Mexican ,, ...	0	0	3½	0	0	4½
Tobasco ,, ...	0	0	4	0	0	6½
Honduras ,, ...	0	0	4	0	0	6½
Maple, Bird's-eye	0	0	6	0	0	8
Rose, Rio ....ton	7	0	0	10	0	0
Bahia	6	0	0	10	0	0
Box, Turkey	5	0	0	17	0	0
Satin, St. Domingo ....foot	0	0	6	0	0	10
Porto Rico	0	0	7	0	1	0
Walnut, Italian	0	0	4	0	0	5

METALS.						
Iron—Pig, in Scotland ....ton	0	0	0	0	0	0
Bar, Welsh, in London	4	7	6	4	15	0
,, ,, in Wales	4	2	6	4	7	6
,, Staffordshire, London	5	10	0	6	0	0
Sheets, single, in London	6	15	0	8	10	0
Hoops ,, ...	6	0	0	7	0	0
Nail-rods ,, ...	5	15	0	6	10	0

METALS (*continued*).	£.	s.	d.	£.	s.	d.
Copper—						
British, cake and ingot ....ton	44	0	0	45	0	0
Best selected	45	0	0	46	0	0
Sheets, strong	51	10	0	52	0	0
,, India	49	10	0	0	0	0
Australian	0	0	0	0	0	0
Chili, bars	40	12	6	41	0	0
Yellow Metal ....lb.	0	0	4	0	0	4½
Lead—						
Pig, Spanish ....ton	12	13	9	12	15	0
English, common brands	13	2	6	0	0	0
Sheet, English	13	16	3	14	0	0
Spelter—						
Silesian, special ....ton	14	7	6	14	10	0
Ordinary brands	14	5	0	14	7	6
Tin—						
Banca ....ton	0	0	0	0	0	0
Billiton	0	0	0	0	0	0
Straits	100	10	0	0	0	0
Australian	101	5	0	0	0	0
English ingots	104	0	0	0	0	0
Zinc—						
English sheet ....ton	0	0	0	0	0	0

OILS.						
Linseed ....ton	20	5	0	20	10	0
Cocoanut, Cochin	36	10	0	37	0	0
Ceylon	27	0	0	0	0	0
Copra	0	0	0	0	0	0
Palm, Lagos	25	0	0	25	10	0
Palm-nut Kernel	0	0	0	0	0	0
Rapeseed, English pale	22	5	0	0	0	0
,, brown	20	15	0	0	0	0
Cottonseed, refined	19	0	0	20	10	0
Tallow and Oleine	25	0	0	45	0	0
Lubricating, U.S.	6	0	0	10	0	0
,, refined	8	0	0	13	0	0
Turpentine—						
American, in casks ....cwt.	1	8	0	0	0	0
Tar—						
Stockholm ....barrel	0	15	0	0	15	6
Archangel	0	10	6	0	11	0

COMPETITIONS AND CONTRACTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Boys' Upper School, Caerleon	The Governors	Not stated	Dec. 3rd	i.
Sewage System	Cleethorpes U.S.A.	30*l.*, 20*l.*, and 10*l.*	Not stated	i.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
Making-up Roads	Wandsworth Bd. of Wks	*Official*	Nov. 23rd	ii.
Paving Works	St. Luke's Vestry	do.	Nov. 24th	ii.
Re-Making Roads, &c., Sidcup	....	R. Tomlinson	Nov. 25th	ii.
Removal of Snow, Ice, Sludge, &c.	St. Martin-in-the-fields Vestry	*Official*	do.	ii.
Extension of Girls' and Infants' School	Barnes School Board	do.	Dec. 1st	ii.
Enlargement of Sorting-Office, Poplar	Com. of H.M. Works	do.	Dec. 3rd	ii.
Erection of Eight Cottages, &c.	Admiralty	do.	Dec. 10th	ii.
Brick and Pipe-Sewers, Carriageways, &c.	Met. Board of Works	do.	do.	i.
Erection of New Board Schools, &c.	Schl. Board for London	do.	Not stated	ii.
Erection of a Villa Residence	....	G. Lansdown & Harriss	do.	ii.

TENDERS.

BEDFORD.—For the erection of eight villa residences, in Conduit-road, Bedford, for Mr. D. C. Preston. Mr. F. T. Mercer, architect, Bedford. Quantities supplied:—

First List.

Garrud, London	£6,558	0	0
Ansell, London	6,550	0	0
Warton & Walker, Bedford	6,436	0	0
Potter, Bedford	6,360	0	0
Spencer, Bedford	6,310	0	0
Harrison, Bedford	6,110	0	0
Foster, Bedford	6,105	0	0
White, Bedford	6,057	0	0
Balaam, London	5,928	0	0
Laughton, Bedford	5,645	0	0

Second List (Quantities reduced).

Ansell	£5,956	0	0
Warton & Walker	5,732	0	0
Garrud	5,685	0	0
Potter	5,608	0	0
Balaam	5,534	0	0
Harrison	5,428	0	0
Foster	5,381	0	0
White	5,352	0	0
Laughton (accepted)	5,000	0	0

BRIGHTON.—For sanitary and decorative work at 10, Goldsmid-road. Mr. Chas. Edward Gritton, surveyor, Brighton:—

George Lynn & Sons, Brighton (accepted) £110 0 0

BURY ST. EDMUNDS.—For additional works in connexion with the sewage scheme:—

McKay* £2,275 0 0

* Accepted at 2,175*l.*

[No competition.]

CRANBROOK (Kent).—For the erection of three cottages, Angley Park, Cranbrook, Kent, for Mr. E. L. Tomlin. Mr. Mervyn E. Macartney, architect. Quantities by Messrs. Evans & Deacon, Adelaide-street, Strand:—

Maides & Harper	£1,367	0	0
Punnett & Son	1,342	0	0
Marshall & Son	1,287	0	0
Foster & Dicksee	1,260	0	0

CHISLEHURST.—For the erection of a house to be known as Northwood, Chislehurst, Kent, for Mr. Alfred J. Newton. Mr. James W. Burgess, architect, 2, Wilby-road, Camberwell. Quantities supplied by the architect:—

Mowlem & Co.	£4,111	0	0
A. Sykes	4,069	0	0
G. & S. Fisher	3,879	0	0
Higgs & Hill	3,840	0	0
M. Gentry	3,818	0	0
Brass & Son	3,798	0	0
B. E. Nightingale	3,743	0	0
M. Manley	3,569	0	0
M. Marsland	3,425	0	0
R. A. Lowe	3,329	0	0
Spencer & Co.	3,250	0	0
J. Smith & Sons, Norwood Junction*	3,197	0	0
H. Beasley	3,175	0	0

* Accepted.

CLACTON-ON-SEA.—For making, metalling, steam rolling, kerbing, channelling, and paving nine roads, for the Tendring Hundred Rural Sanitary Authority:—

W. T. Hook (accepted) £8,107 10 0

[Twelve tenders submitted.]

EDENBRIDGE (Kent).—For laying out land, pumping station, and sewerage works. Mr. John Green Hall, C.E., engineer:—

W. Neave & Son, Paddington	£3,960	0	0
L. Bottoms, Battersea	3,930	0	0
E. Smith, Edenbridge	3,925	0	0
H. F. Brow, Suffolk-lane, London	3,868	0	0
Paramor & Son, Margate	3,700	0	0
G. E. Wallis	3,434	0	0
J. J. Wise, Deal	3,413	0	0
H. Knight, Norden, Mitcham	3,325	0	0
B. Cooke & Co.	3,275	0	0
Woodham & Fry, Greenwich	3,183	0	0
J. H. L. Dame, Walmer	3,150	0	0
R. Cowdrey, Newent, Gloucestershire	3,146	0	0
H. R. Treherne & Co., Battersea	3,075	0	0
J. Dickson, St. Alban's	3,044	0	0
W. H. Dearle, Chichester	3,035	0	0
G. Punnett & Sons, Tonbridge	3,015	9	11
E. P. W. Iles, Wimbledon	2,994	0	0
J. Young, Buckhurst-hill, Essex	2,990	0	0
J. Edmondson, Lower Edmonton	2,953	5	6
Innes & Wood, Birmingham	2,878	0	0
J. J. B. Marshall, Brighton	2,873	7	6
J. Hayward, Eastbourne	2,843	12	3
W. Cunliffe, Dorking	2,689	15	0
Foster & Dicksee, Rugby	2,680	0	0
H. Hill, High Wycombe (accepted).	2,476	14	0

HAMPTON WICK.—For alterations and additions at St. John's Church, Hampton Wick, Middlesex. Mr. R. T. Elsam, architect, Hampton Wick. Quantities by the architect :—

G. Constable, Hampton Wick	£690	0	0
W. Hickinbotham, Teddington	630	0	0
T. Wheatman, Hampton Wick	628	17	0
J. F. Collinson, Teddington	596	0	0
J. Spink, Hampton Wick	560	0	0
C. Bonell, Teddington	540	0	0
C. Oldridge & Sons, Norbiton	534	16	0
J. Piller, Teddington	512	0	0
T. Wheeler, Kingston	484	18	6

HULL.—For the ironwork of Drypool Bridge, over the river Hull, for the Hull Corporation :—

Earle's Shipbuilding Company, Hull	£12,293	0	0
Handysides & Co., Derby	12,118	0	0
Head, Wrightson, & Co., Stockton-on-Tees	11,815	10	6
Whittaker Bros., Leeds	11,596	0	0
J. Butler & Co., Stanningley, near Leeds (accepted)	11,550	0	0

LONDON.—For alterations and additions to 181, Upper Thames-street, for the Albion Iron Company. Mr. F. J. Chambers, architect :—

	Estimate A.	Estimate B.
Gerrard	£439	£212
Loader & Son	435	197
Allen & Son	435	180
Parker (accepted)	329	167

LOUGHBOROUGH (Leicestershire). — For Loughborough Waterworks extension to Blackbrook. Mr. Geo. Hodson, M. Inst. C.E., consulting engineer. Mr. Herbert Walker, C.E., engineer :—

Contract No. 1.

J. Farrer & Co., Barnsley	£6,178	4	9
Clay Cross Co., Chesterfield	5,793	4	6
T. Small & Sons, Handsworth	5,421	9	6
J. & S. Roberts, West Bromwich	5,420	17	11
Butterley Co., Alfreton	5,406	9	1
Cochrane & Co., Dudley	5,334	1	8
Staveley Iron Co., Alfreton	5,260	2	4
Stanton Iron Co., Nottingham	5,114	7	8
J. Oakes & Co., Alfreton Ironworks*	4,893	0	0

* Recommended for acceptance, conditionally.

Contract No. 2.

H. Hill, High Wycombe	£5,855	0	0
J. Knight, Loughborough	5,774	14	2
F. Dawson, Bury	5,167	0	6
Walmesley & Co., Preston	5,140	0	0
Holme & King, Wigan	4,854	0	0
Small & Son, Handsworth	4,480	16	0
W. Drewitt, Stoke-on-Trent	4,409	0	0
A. Faulks, Loughborough	4,350	0	0
Foster & Barry, Nottingham and London	4,250	0	0
J. Mackay, Stoke-on-Trent	4,216	11	0
Innes & Wood, Birmingham	4,214	0	0
Hughes & Son, Lower Gornal, Dudley	4,158	7	9
Pickthall & Son, Merthyr Tydvil	3,979	0	0
Enoch Tempest, Leicester	3,940	0	0
H. Vickers, Nottingham*	3,713	0	0

* Recommended for acceptance, conditionally.

PUTNEY.—For making road and sewer on the Ashbourne House Estate, Putney, for Mr. H. G. Smallman. Mr. Fred. Stocker, surveyor, Lewisham :—

Bath & Blackmore, Clapham	£850	0	0
Harris, Camberwell	847	0	0
Jones Bros., Wandsworth	813	19	0
R. Aviss & Co., Putney	798	0	0
J. Nobbs, Clapham	768	0	0
J. Pizzey, Hornsey	715	0	0
Woodhams, Greenwich	695	0	0
J. Ford & Co., Westminster	677	0	0
W. J. Milton Matson, Clapham	655	0	0
Wm. Nichols, Wood-green	649	0	0
Neal, Wandsworth	648	0	0
Marshall, Brighton	600	0	0
H. R. Trehearne & Co., Battersea	533	0	0
Rowland Bros., Fenny-Stratford*	519	0	0

* Accepted.

RAMSGATE.—For the erection of three dwelling-houses and shops on Abbott's-hill, for Mr. G. Norris. Mr. E. L. Elgar, architect, Ramsgate :—

Paramor & Sons, Margate	£1,700	0	0
J. H. Forwalk, Ramsgate	1,666	0	0
Regis & Coppen, Margate	1,650	0	0
H. Bowman, Ramsgate	1,340	0	0
C. Collins, Ramsgate	1,250	0	0
T. Elgar, Ramsgate	1,250	0	0
W. W. Martin, Ramsgate	1,198	0	0
G. M. Dawson, Broadstairs*	943	0	0

* Accepted.

TEMPLEBREDIN (co. Limerick).—For building spire, wrought entrance-gates, railings, piers, and boundary-walls. Mr. W. G. Doolin, M.A., architect, Dublin :—

Jas. Newstead, Fermoy (accepted)	£909	0	0

[Five tendered.]

TOXTETH PARK.—For the construction of a brick sewer in St. Michael's-road, for the Toxteth Park Local Board. Quantities by the engineer, Mr. John Price, Assoc.-M. Inst. C.E. :—

Holme & Green, Liverpool	£222	0	0
J. Garnett, Toxteth Park	203	12	1
R. Lomax, Toxteth Park	202	8	0
L. Marr, Toxteth Park	192	10	2
Catterall & Co., Liverpool	189	16	4
J. Evans, Parkgate (accepted)	161	0	0

[Engineer's estimate, 170*l.*]

TOXTETH PARK.—For pulling down and re-erecting wall in Aigburth-road, for the Toxteth Park Local Board :—

McCabe & Co., Kirkdale	£122	18	3
Holme & Green, Liverpool	86	0	0
Catterall & Co., Liverpool	77	4	4
G. Porter, Toxteth Park	73	19	0
L. Marr, Toxteth Park	73	13	4
R. Lomax, Toxteth Park	66	4	4
J. Evans, Parkgate	56	15	0
Ireland & Hurley, Liverpool (accepted)	48	15	8

[Engineer's estimate, 60*l.*]

WORCESTER PARK (Surrey).—For the erection of house, Lawn View, Worcester Park, Surrey, for Mr. E. C. Stapylton. Messrs. Whitfield & Thomas, architects, Cockspur-street. Quantities by Messrs. Evans & Deacon, Adelaide-street :—

Hards	£1,910	0	0
Foster & Dicksee	1,799	0	0
Turtle & Appleton	1,795	0	0
Maides & Harper	1,793	0	0
Bottrill	1,789	0	0
Oldridge & Sons	1,768	0	0
Adkins Bros.	1,748	0	0

***SPECIAL NOTICE.*—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our office, 46, Catherine-street, W.C., *not later than Four p.m.* on THURSDAYS.**

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G. R. (as we have repeatedly informed our readers, we do not publish tenders accepted unless the amounts are given).—S. D.—J. H. H. (your letter is an advertisement).—J. R. (we will combine the two as you suggest).—J. E. & Sons (we cannot do anything of the kind).—V. S.—R. W. (thanks).—V. (not a matter of any public interest).—B. R. (next week).

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